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July 1872

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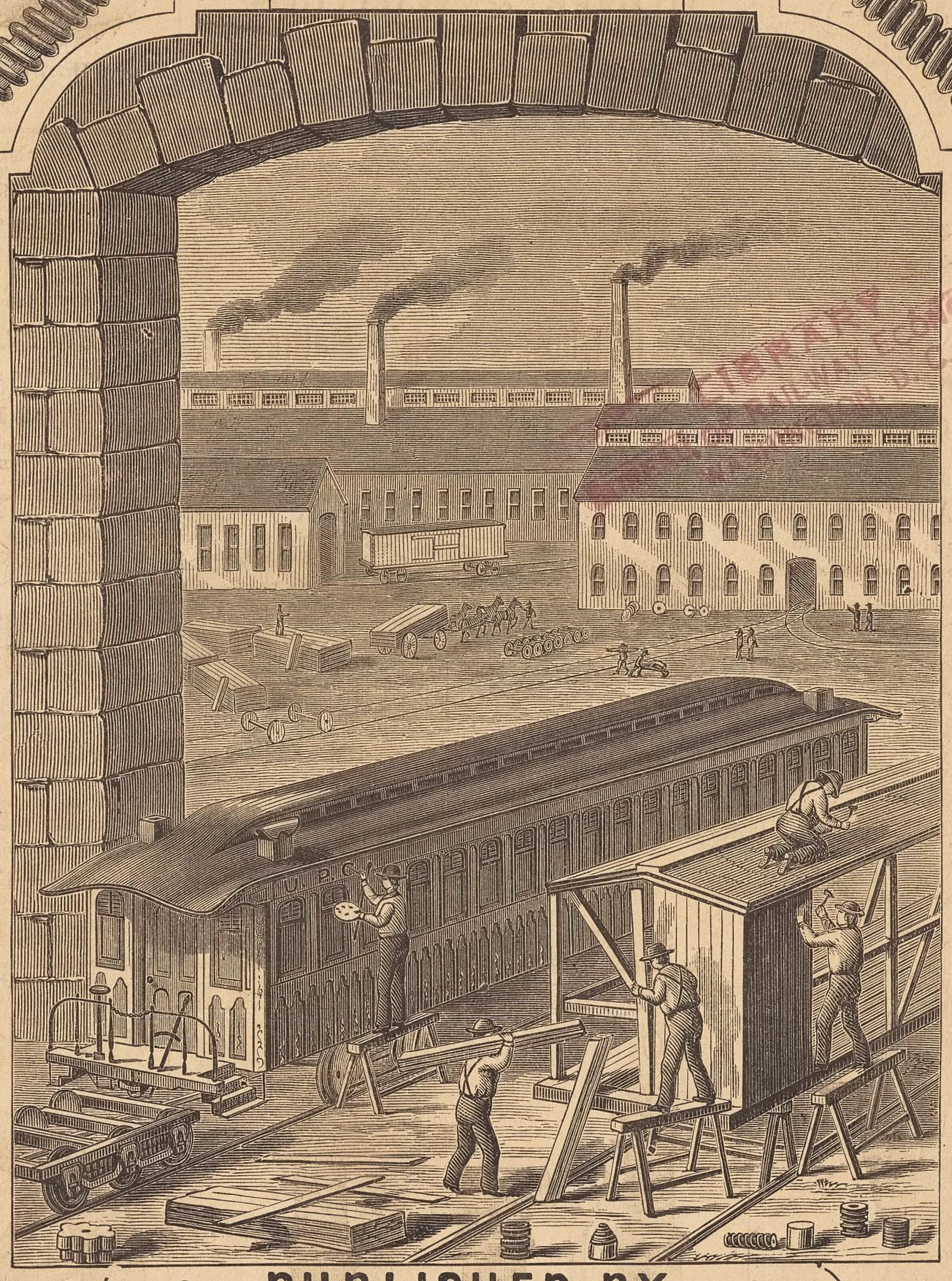
Vol. III. JULY, 1872. No. 1.



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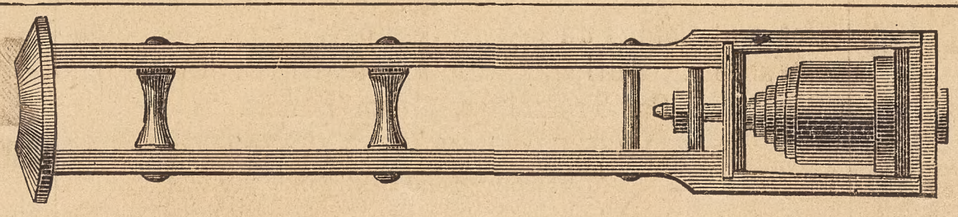

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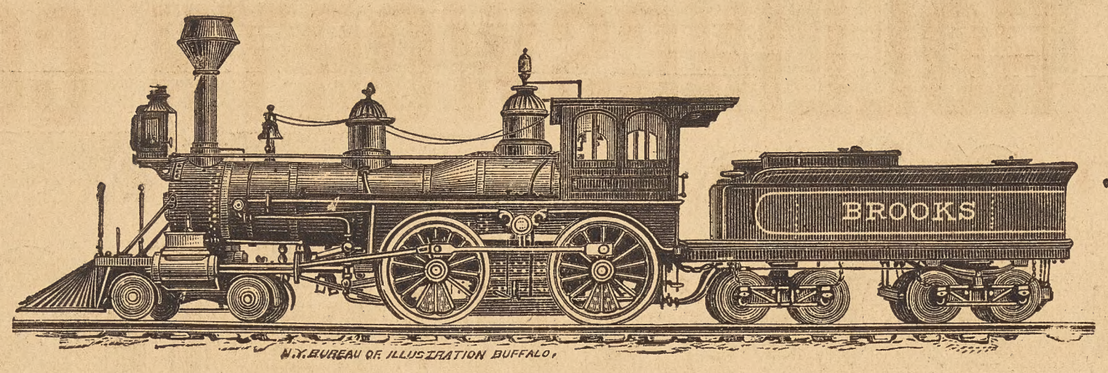

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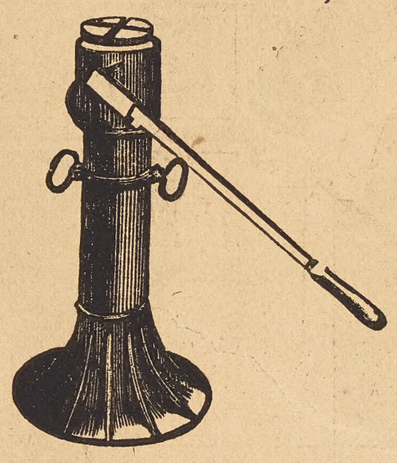

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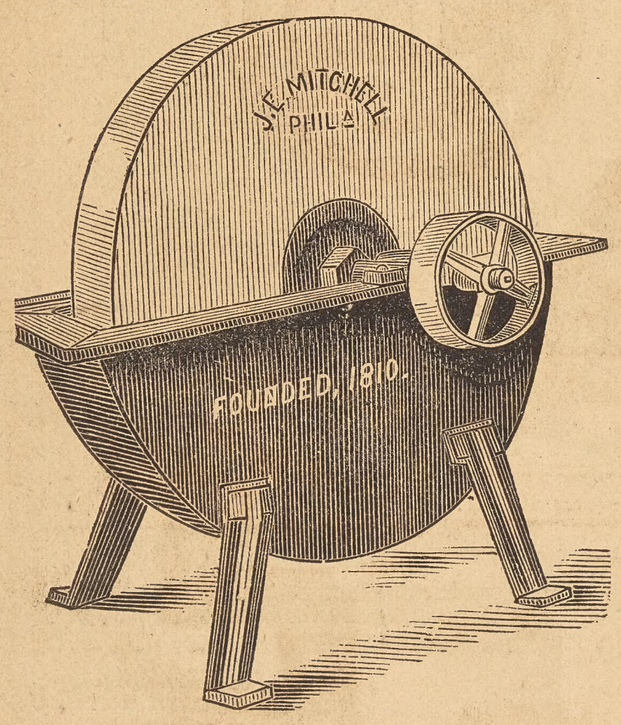

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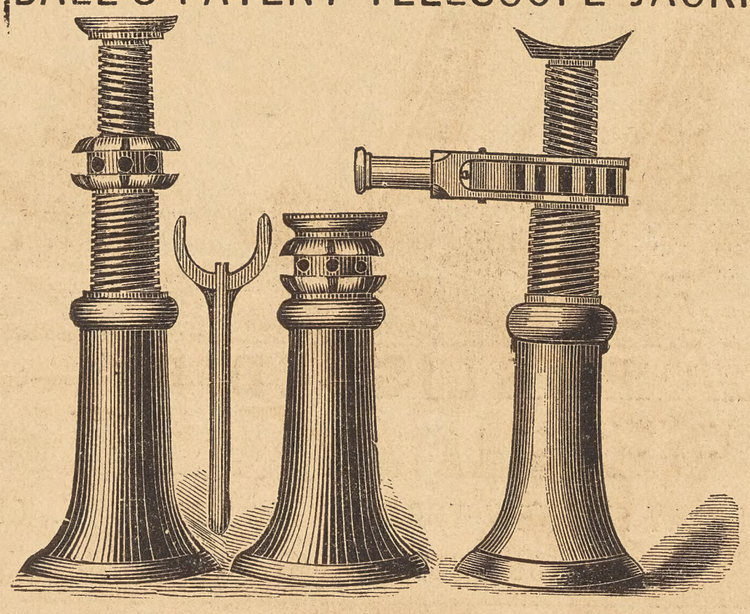

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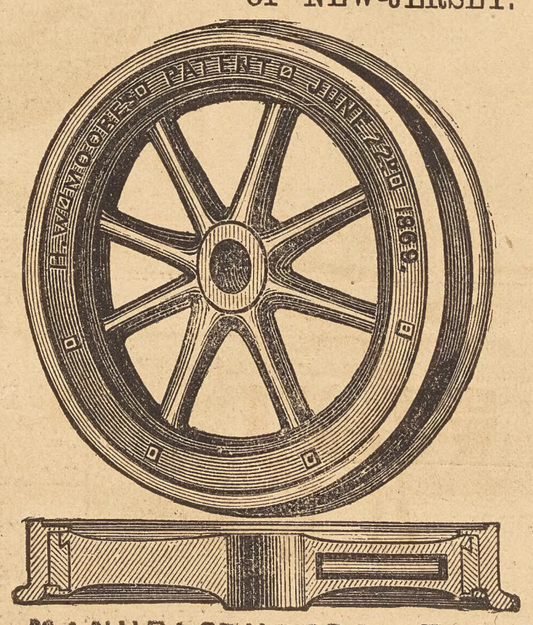

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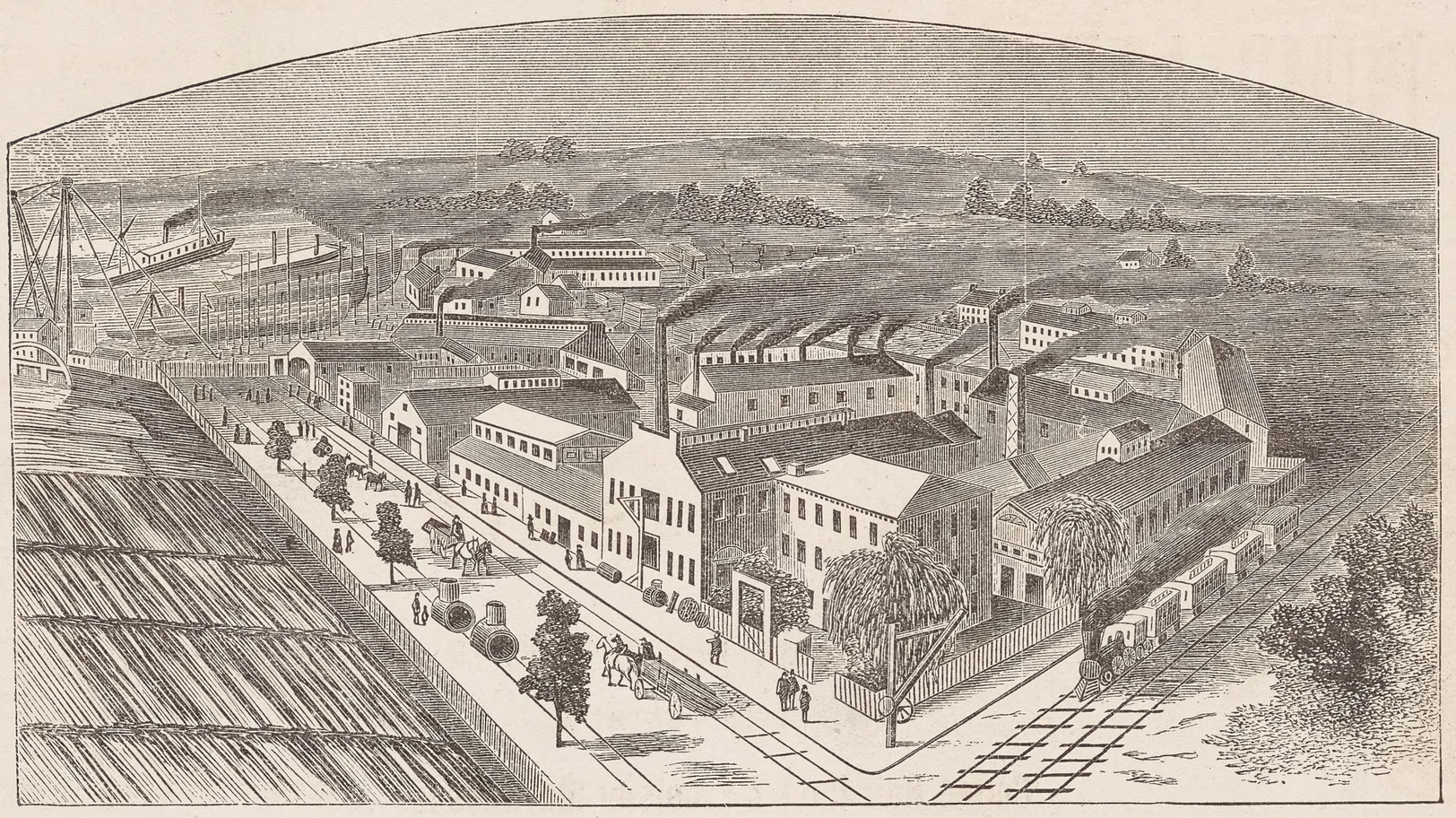

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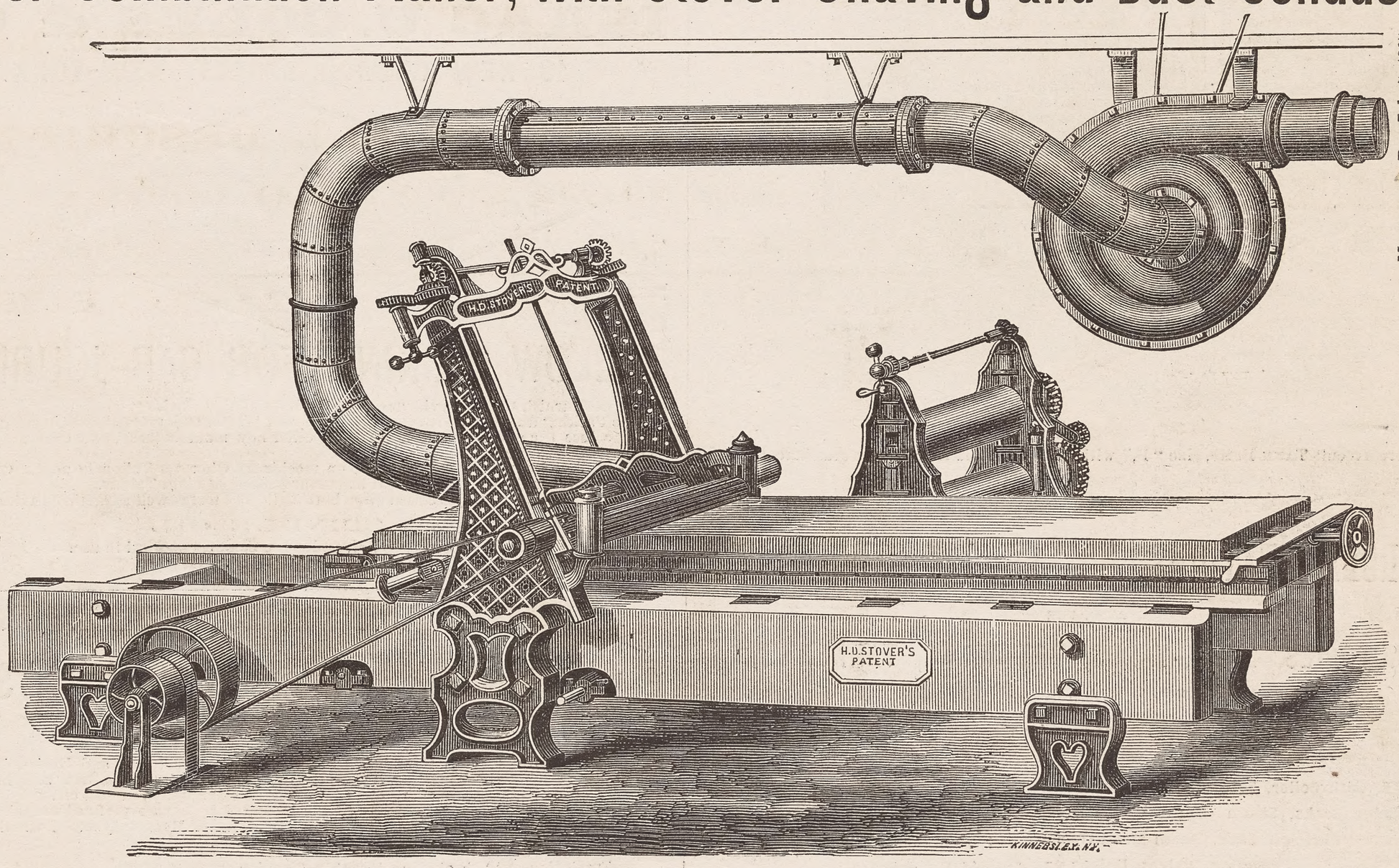

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WM. F. SMITH, Master Mechanic.

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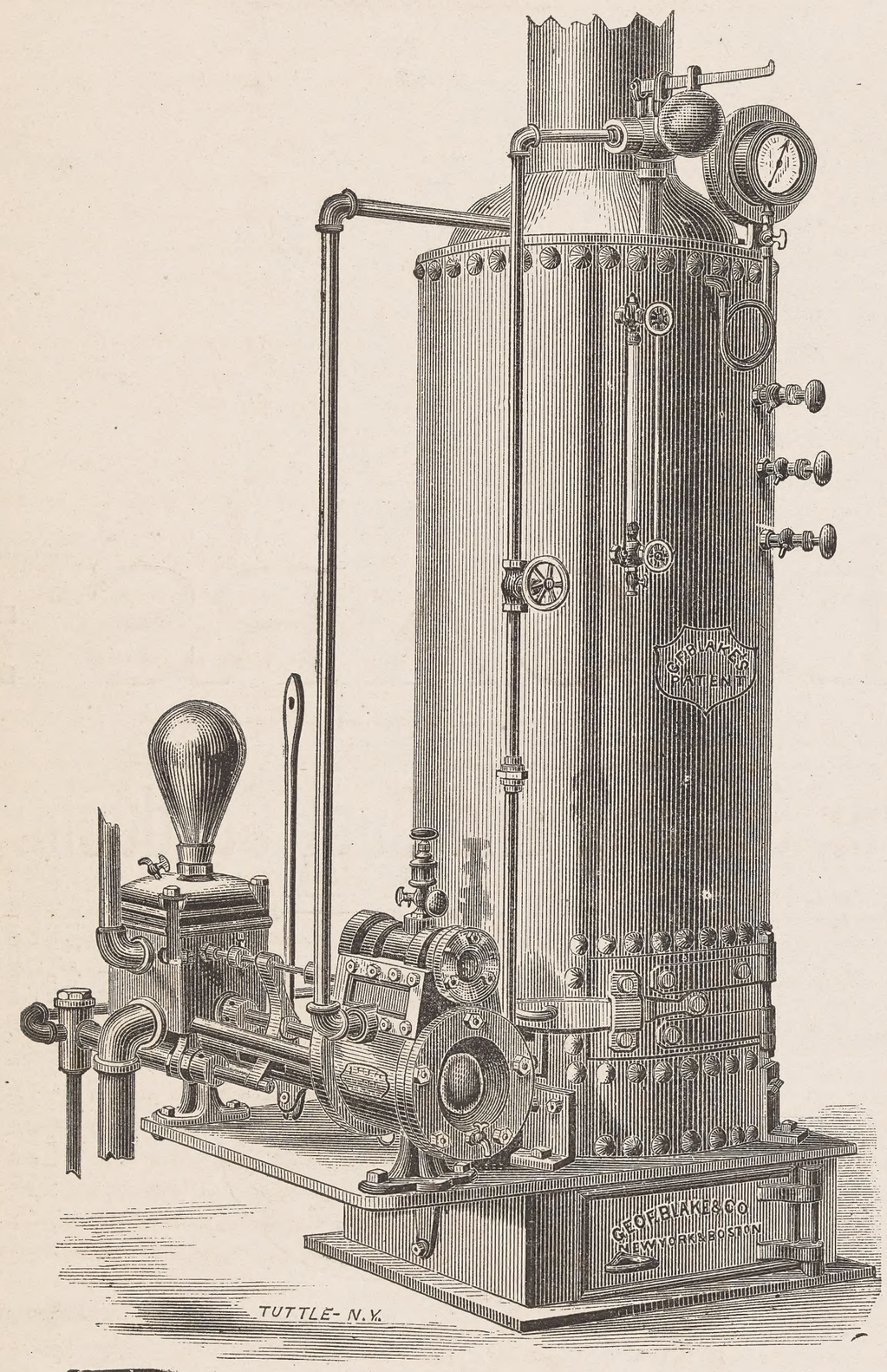

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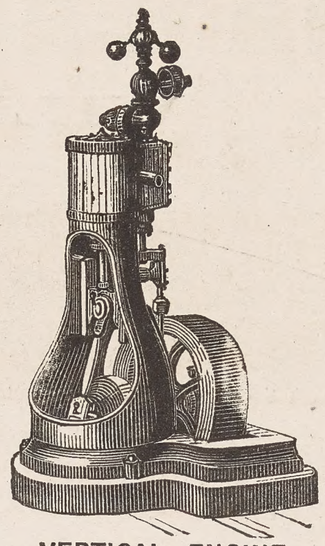

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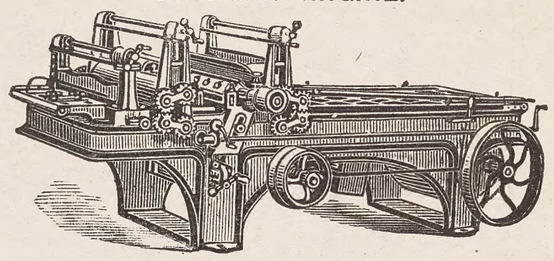

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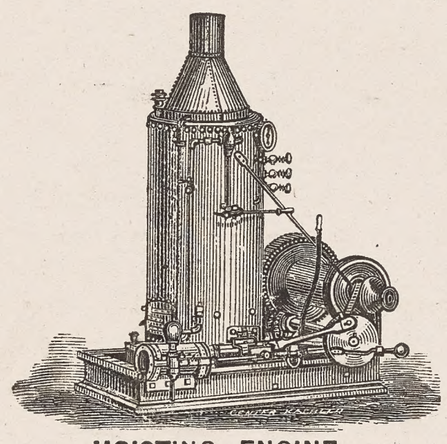

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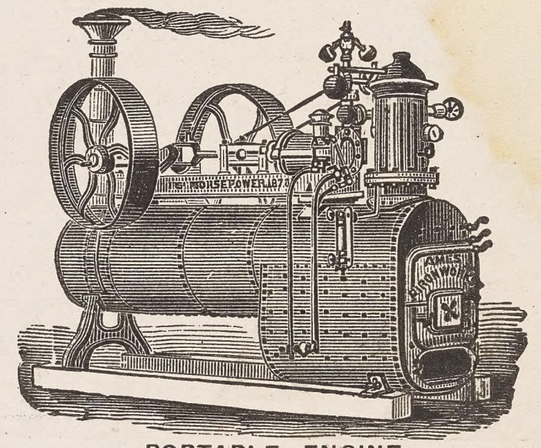

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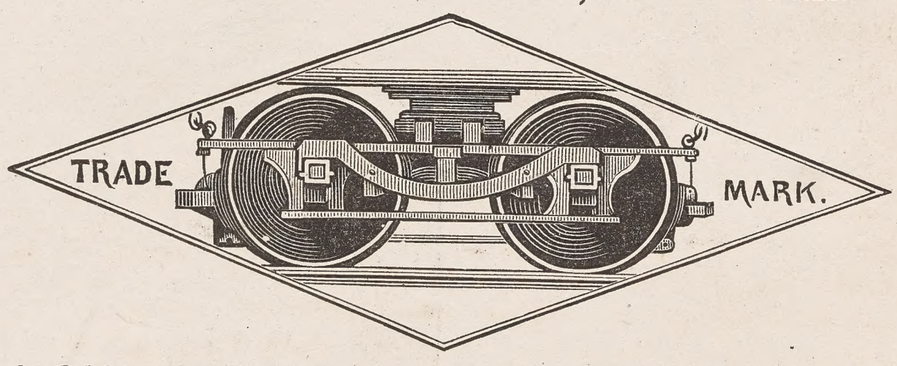

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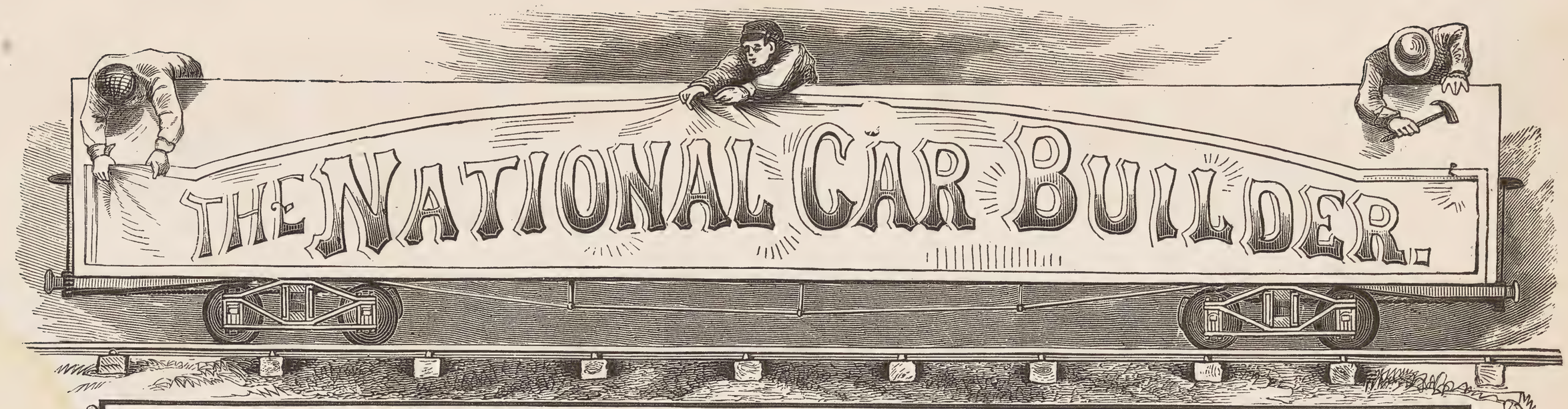

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SIXTH ANNUAL CONVENTION

OF THE

Master Car-Builders' Association.

THE delegates to the Sixth Annual Convention of the United American Railway Master Car-Builders' Association assembled on the 12th of June, proximo, at the Southern Hotel in the city of St. Louis. The convention was called to order at nine o'clock A.M., by the President, M. C. Andrews, Esq., of the New-York and New-Haven Railroad. The Vice-President of the Association, Mr. M. P. Ford, not being present, the chair announced that the first business in order would be an election to fill the vacancy.

Mr. Joseph Jones moved that the vacancy be filled by the appointment of Hugh Gray, of the Chicago and North-western Railroad, which motion was unanimously agreed to, and Mr. Gray thereupon took his seat as vice-president *pro tem.* After a brief recess, for the purpose of examining models and drawings, the chair again called the convention to order, and delivered the following address:

THE PRESIDENT'S ADDRESS.

GENTLEMEN OF THE CONVENTION: I congratulate you upon this the sixth annual meeting of our association. The time fixed for the present meeting, and in accordance with wthich we have this day assembled, has proved to be an unfortunate one as regards a full attendance, inasmuch as the Boston Jubilee will doubtless make it inconvenient for many of the railr ad officials to be absent from their respective posts of duty at the same time. I trust, however, that our present meeting will be an interesting one, and productive of important practical results. We have a large amount of business to transact, and it is to be hoped that the realization of this fact, and its bearing upon the important interests represented by our association, will stimulate every member in the performance of the duties devolving upon him. We are here for the purpose of interchanging views and suggesting improvements in regard to the great branch of mechanical industry with which we are identified; and especially for establishing approved and uniform sizes and patterns for the various parts of cars, so far as the same can be done. The passenger and freight rolling-stock of our roads travel such immense distances, and run over so many connecting lines, that the adoption of some system of standard sizes and patterns has become a matter of absolute necessity, so that cars can be economically and speedily repaired, no matter how far they may be from where they belong. I think it especially important that a standard size of axle, journal-bearing, and oil-box should be established, as they are only second in importance to the height of draw-bars.

The committees appointed at the last annual meeting will submit their reports upon the various topics assigned them, and these reports will, I trust, receive the earnest attention of the convention. I do not feel it necessary to dwell upon details, or occupy your time with a long address. As my worthy predecessor remarked upon a former occasion, I feel more competent to handle the mechanical rule than to administer rules of parliamentary practice as your presiding officer; but I will discharge the duties of my position to the best of my ability, relying upon your indulgence and support in the progress of our deliberations.

On motion of Mr. F. D. Adams, the following committees were appointed by the chair:

On Credentials.—Messrs. James T. Leighton, M. Wilder, and J. Ferris.

On Communications.—Messrs. F. D. Adams and R. S. Ramsey

The roll was then called, and the following members answered to their names:

Joseph Jones	New-York Central & H. R.R.	N. Y.
Enos Varney	Fitchburg R.R.	Mass.
F. D. Adams	Boston & Albany R R.	"
Leander Garey	New-York & Harlem R.R.	N. Y.
A. Steinbach	Philadelphia & Reading R.R.	Pa
Henry Scriba	Pitts. & Connellsville R.R.	"
R. S. Ramsey	Pennsylvania Central R.R.	"
H. O. Wadlie	Illinois Central R.R.	Ill.
Hugh Gray	Chicago & North-western R.R.	"
R. V. Coon	Troy & Boston R.R.	Mass.
C. Woods	Union Line Tr. Co.	Pa.
James McGee	Pitts., Cin. & St. Louis R.R.	Ohio.
D. Hoit	Toledo, W. & Western R.R.	"
W. H. H. Allison	Cin., Hamilton & Dayton R.R.	"
R. Reniff	Chicago & Alton R.R.	Ill.
George Hackett	Central of New-Jersey R.R.	N. J.
E. A. Olmstead	Long Island R.R.	N. Y.
William Johnson	New-York Central & H. R. R.R.,	"
M. C. Andrews	New-York & New-Haven R.R.	"
H. Kirmse	Pan Handle R R.	W. Va.
J. H. F. Wiers	A. & G. Western R R.	Pa.
R. D. Cole	Atlantic & W. Point R.R.	Va.
A. Steinbrunner	Cleveland & Pittsburg R.R.	Ohio.
George E. Stevens	Union Pacific R.R.	Neb.
John Marquis	Pitts., F. Wayne & Chicago R.R.	Pa.
W. F. Smith	Cleveland, Columbus & Cin. R.R.	Ohio.
J. L. Hackathorn	Kentucky Central R.R.	Ky.
W. W. Wilcox	Chicago, Burlington & Quincy R.R.	Ill.
D. S. Dockstader	Atlantic & G. Western R.R.	Pa.
J. J. Kirkland	Pitts., F. Wayne & Chicago R.R.	Ohio.
W. B. Snow	Illinois Central R.R.	Ill.
H. F. Douglass	Late of N. Haven & Northampt'n R.R.	Ct.
H. Longest	Rich., Danville & Piedmont R.R.	Va.
W. W. Bedient	Late of Danbury & Norwalk R.R.	Ct.

The minutes of the last annual meeting were then read and approved.

On motion, the chair was authorized to appoint all regular committees during the present session.

On motion, the following special committees were then appointed:

On Circulars.—Messrs. John Kirby, D. Hoit, and Joseph Jones.

On Finance.—Messrs. James McGee and A. Steinbach.

On Models and Drawings.—Messrs. George Hackett, S. A. Davis, and H. C. Whiting.

On Officers for ensuing year.—Messrs. F. D. Adams, R. S. Ramsey, and H. O. Wadlie.

AMENDMENTS TO THE CONSTITUTION.

On motion of Mr. Garey, the order of business was suspended, and the following resolutions were offered by him proposing certain amendments to the constitution of the association:

Resolved, That section one of article three, providing who shall become members of the association, be amended by inserting the words, "and railway superintendents." Adopted.

Resolved, That there shall be an additional section to article three, to be known as section four, which shall read as follows:

"Civil and mechanical engineers and others whose qualifications and experience may be valuable to the association, may become associate members when recommended by a supervisory committee. All associate members must be elected by ballot at a regular meeting, and five dissenting votes shall reject. Associate members shall be entitled to all the privileges of active members except the privilege of voting." Adopted.

Resolved, That section three of article three be amended so as to read as follows:

"All members will be liable to assessment for annual dues to defray the necessary expenses of the association, as decided at each annual meeting; and each one signing, or causing to be signed, the constitution, will be considered a member until he voluntarily resigns." Adopted.

Mr. Garey moved to amend the title of the association, which now reads, "The United American Railway Master Car-Builders' Association," so that it will hereafter read, "The Railway Master Car-Builders' Association," and stated in support of his motion that the title was too long, and that the words "United American" were superfluous.

Mr. Adams moved to amend the amendment by striking out the word "Railway." He had always been dissatisfied with the title, and would prefer to write it in full, with the additional words, "of the United States and Canada," so as to include this entire end of the continent, or else cut it down and make it as short as possible.

Mr. Garey accepted the amendment, and his original motion, as amended, was agreed to, so that the name of the association is now "The Master Car-Builders' Association."

NEW MEMBERS.

The following gentlemen then signed the constitution, and became members of the association:

S. Griffith	Ind., Cin. & Lafayette R.R	Ohio.
Joseph Townsend	Missouri, Kansas & Texas R.R.	Mo.
W. B. Phelps	Fourth Avenue Street Line.	N. Y.
S. A. Davis	Boston, Lowell & N. shua R.R	Mass.
C. J. Holbach	Cat. & Foglesville R R	Pa.
J. W. Sauerbach	Cleveland & Pittsburg R R	Ohio.
James T. Leighton	New-Haven Car Co.	Ct.
M. Wilder	Erie R.R.	N. Y.
John Ferris	Housatonic R.R.	Ct.
J. C. Buckhout	New-York & Harlem R.R	N. Y.

Josiah Stahl.....Mo. R., Ft. Scott & Gulf R.R.....Mo.
George Rowe.....New-York Cen. & H. River R.R....N. Y.
J. W. Holmes.....A. & Great Western R.R.....Pa.
W. H. Johnson.....New-Orleans, Mobile & Texas R.R.La.
John Kirby .....Lake Shore & Michigan So. R.R....Ohio.
R. B. More.....Ind. & St. Louis R.R.....Ill.
C. S Buck .....St. Louis, K. City & Northern R.R..Mo.
Oscar Doolittle.....St. Louis & Iron Mountain..... "
W. H. H. Price .. .Evans., Henderson & Nash. R.R...Ky.
R. E. Smith.....Des Moines Valley R.R. .....Iowa.
F. S. Tull.....Houston & Texas Central.....Texas.

TREASURER'S REPORT.

The report of the Treasurer of the association was then presented and read by the Secretary, as follows:

Amount received	$818 95
Amount expended	326 14
Balance on hand	$492 81

AARON STEINBACH, *Treasurer.*

DICTIONARY OF TERMS.

The committee on this subject, appointed at the last annual meeting, consisting of Messrs. F. D. Adams, M. C. Andrews, Leander Garey, A. Steinbach, C. A. Smith, Joseph Jones, and I. W. Van Houten, made a report through their chairman, Mr. Adams, who said that the committee had issued an illustrated circular showing every part of a car-truck, including the various parts of the wheel, axle, and oil-box, each part being numbered; and then had sent a copy thereof to every master car-builder of the United States and Canada, with an accompanying printed blank, likewise numbered, with the request that every master car-builder insert opposite each number the name or names used on his road, for the piece designated by the same number in the engraving, requesting that the same be filled out and returned to the secretary, early as possible. Mr. Adams stated that the committee found they had taken a big job on their hands: the matter was of vast importance, and they had been unable to complete it, although they had held many meetings. They had therefore made no attempt to complete it for presentation at this session, and could only report progress. The more they looked at it, the more important it seemed. They did not wish to present it in an unfinished state. It was a work of years to perfect it, but they had finally succeeded in maturing a plan to bring it to a practical result. They had issued circulars to superintendents to enlist them in the service, and the *Railroad Gazette* had kindly placed at their disposal a large number of cuts of the different trucks, parts of trucks and car-bodies, which would have cost to engrave specially for the work in hand, thousands of dollars; and the committee had decided to issue circulars from time to time through the *Gazette*, and publish the replies thereto in the same valuable journal. THE NATIONAL CAR-BUILDER had also placed its columns at their disposal, and would publish questions and answers and discussions thereon.

The immense importance of this dictionary when perfected could hardly be estimated. Large connecting roads, whose cars were constantly interchanging and being carried thousands of miles from where they were built, often remaining away for months, saw its necessity; though perhaps to smaller roads, whose cars did not leave their own lines, it was not so apparent.

The committee proposed to publish these circulars, and after receiving replies, to meet from time to time and decide upon the most appropriate term to be used to designate that particular thing, and then put under the name so chosen, *all* the names used on all the roads throughout the United States, to describe the same article, so that a car-master receiving a telegram to furnish some distant shop with a certain part of a car, which had broken or required to be replaced, could turn to the dictionary, and, without loss of time, see exactly what was wanted. Mr. Adams stated, as an example of the trouble and inconvenience of the present absence of system, that he had recently received a dispatch from a car-master to send him an oil-box cover, and he would not have known what was meant, had he not had a previous conversation on the subject with the car-master, as the name used bore no relation in his mind to the thing asked for; and there were sometimes fifteen or twenty different names used to designate the same thing, as, for instance, "oil-box," "case," "housing," "pedestal;" and in the case of "buffer," "bunter," "bumper," "bull-nose," "draw-bar," etc.

Mr. Garey, from the same committee, said if the convention would think for just five minutes of the great importance of this dictionary of terms, not only to master car-builders, but to superintendents and others, they would devote the next two hours to the subject, and think it time well spent. The committee had provided circulars, which were lying on the table, and he wished every master car-builder in attendance would take one home with him and fill it out and return it promptly to the committee. If this dictionary is once brought to completion, its value alone would warrant all the expense and time expended in holding this convention. On motion of Mr. Garey, the report was accepted, and the committee continued, with instructions to go on with the work.

The President stated that the Chairman of the Committee on Ventilation, Mr. M. P. Ford, was absent, and that his report would probably be sent in before the close of the session.

OIL-BOXES AND JOURNAL-BEARINGS.

The committee on these subjects, consisting of Messrs. J. B. Somerby, E. Varney, and A. Gleason, made a report to the effect, that for the past twenty years they have used the Lightner Box, and know of nothing better. Mr. Somerby's experience with brass bearings did not impress him favorably. He had tried them under Pullman cars, and they heated so badly they had to be taken out and Babbitt-metal substituted. He had also tried brasses under oil-cars, and they spoiled the journals. Messrs. Varney and Gleason had not used brass bearings.

Mr. Garey said, that judging from the report, the committee had only given their own individual experience. He hoped all present would express their opinions on the subject. He had used solid composition bearings on the New-York and Harlem road almost exclusively for eighteen years, the material being tin and copper, and could not from his own experience recommend Babbitt for general use. He was running 50 feet drawing-room cars on journals $5\frac{1}{2}$ by $3\frac{1}{4}$, very successfully with solid bearings.

Mr. Varney stated that his road had used composition or Babbitt-metal. It was composed of tin, copper, and antimony, and worked well. He made a shell of brass and filled it with Babbitt.

Mr. Kirby stated that nothing connected with cars was more important to railroad managers than the question of brasses or car-bearings. "Brasses" was an indefinite term for car-bearings or journal-bearings. He had used several kinds on the road with which he was connected. Had used a composition of ten parts of lead and one of antimony, called Babbitt-metal, in a brass shell, but found after a time, that the composition was worn out and the journal was running on the shell. Had given up the use of a filled bearing and now used solid ones. A composition of seven parts copper and one of tin had been used. If bearings are made right, there is no trouble, but he was opposed to Babbitt-metal as it is generally used. Would like to hear expressions of opinion on this subject, as he considered it a very important one.

Mr. Davis said there were two kinds of bearings in use, the lined and solid. As to Babbitt-metal, very few saw it at the present time. It was impossible to get it unless the roads make it themselves. The original Babbitt was composed of a small part of antimony and a large proportion of tin. Genuine Babbitt would wear well.

Mr. Steinbach said that on his road they had about 108,000 journal-bearings in use. They rated all cars as 4-wheel cars; had used a cast-iron skeleton and filled it with a composition of copper, tin, and antimony; made their own bearings; some were four inches in length, and all the way up to eight inches; thought a medium preferable; when the composition wore down, the skeleton was refilled.

Mr. Adams asked, if in case it wore down to the cast-iron, it would affect the journal; and if so, how would it affect it?

Mr. Steinbach replied that it would probably injure the journal if it wore down to the iron.

Mr. Adams asked if Mr. Steinbach would recommend that kind of bearing for connecting roads. He (Mr. A.) had understood that, owing to the nature of the traffic, the cars on the road represented by Mr. S. could not be used on other roads. That gentleman's road was a very important one, and his experience in connection with it was valuable; but he (Mr. Adams) was compelled to differ with him, as he had never seen cast-iron journal-bearings work well, and he had seen many kinds in his experience on the Boston and Albany and Lake Shore and Michigan Southern roads with which he had been connected. He used a filled bearing, and preferred them made of a composition shell of about seven parts copper and one part tin, with a strip of same running lengthwise the bearing to strengthen it. This should be filled with good Babbitt. The strengthening bar should be from $\frac{3}{4}$ to 1 inch wide. Roads would save in the long run by the use of good metal filling, and should not buy the cheapest, if poor in quality. It isn't the first cost that tells in the long run. The best is the cheapest. If solid brasses are used, they should be well cared for. If on failure to lubricate, they get hot, they will braze to the journal and sometimes twist it off. He had prevented hot boxes on his road by care in oiling, and the use of a good metal shell, and a good but soft composition filling. This does not wear any longer, but required less care and gave better results. There is no difficulty if a good quality of composition is used to start with, and is kept properly oiled.

There were a number of composition bearings in the market. Some worked well, some did not. Had used one called "star-metal," and had very good and very bad luck with it. Two very heavy passenger-cars had run with it for two years, 200 miles a day, at the rate of 30 miles an hour, without having a hot box; but he had never had the same success again. He believed in a good metal properly filled. Preferred the old "Timm" form of bearing, as it equalized the weight better. Lightner's improved box might do the same, but he would be not in favor of his old box.

Mr. Varney stated that Babbitt-metal as originally made was composed of nine parts tin, one part copper, and one part antimony.

Mr. Holmes said a compositon of six to seven parts copper and one of tin, would stand longer. Some use five parts copper, but from six to seven undoubtedly make the best metal. It was of the utmost importance that the ingredients should be *new* metal. If scrap about the shop were melted for the purpose, iron would get mixed with it, and cut the journal.

Mr. Davis said there were cars on his road twenty-five years old, having iron-cased bearings. When he found them, he broke the iron and used the Babbitt to melt up.

At this point of the discussion, a motion was made to lay the report of the committee on the table, which was agreed to.

WHEELS AND AXLES.

The committee on this subject, consisting of Messrs. C. A. Smith, V. D. Perry, and I. W. Van Houten, reported verbally with a view to elicit discussion, and referred to a drawing in possession of Mr. Garey; whereupon

Mr. Garey submitted a drawing of an axle which he had adopted in 1860, since which time, he said, he had often heard of broken axles on other roads, but none on his own road. Ninety-nine out of a hundred broke immediately adjoining and inside of the wheel, and

his experience went to show that the shoulder on the axle at that point was the cause of breakage. The axle represented by the drawing had no shoulder whatever, and none of this kind had broken on his road. The diameter was increased inside the wheel $\frac{1}{32}$ or $\frac{1}{64}$ of an inch to prevent the wheel from getting loose. He used a 25-ton pressure in putting on the wheel. The axle was 5 inches diameter at the wheel, and $3\frac{3}{4}$ inches in the centre.

Mr. Varney said the standard axle on his road was $4\frac{3}{8}$ inches at fit, and $3\frac{3}{8}$ in the centre, and very nearly the same pattern as Mr. Garey's. He used a tapered shoulder $\frac{1}{8}$ of an inch in size, to stop the wheel from shoving on, if it should by any means get loose.

Mr. Kirby thought Mr. Garey's principle correct. The axle should be smaller in the centre, to permit of vibration.

Mr. Varney thought the axle should be so made that the vibration would not be centred, but be distributed throughout the axle.

Mr. Griffith had used a shoulder on axles next the wheel, and had five axles break; but since he had discarded the shoulder, none had broken.

Mr. Garey said that in 1828 he used to have broken axles, and in thinking the matter over, had made up his mind something was wrong. He put a number in the lathe and turned them down. Nearly all were cracked at the shoulder. He failed to find one cracked at any other point.

Several members expressed themselves favorably toward Mr. Garey's form of axle.

Mr. Steinbach did not like a shoulder, but turned his axles in the shape of a groove at that point.

Mr. Adams said he had never seen an axle break outside of the wheel, except where abrasion of the bearing on the journal caused it to twist off. He thought one reason why axles broke was, that the size of them had not been increased the last twenty-five years, while the weight of cars and the loads they carried had been very materially increased.

No problem in operating railroads was more vexatious or more difficult to solve than that of hot boxes The use of a uniform box and axle on all through-lines, would tend very greatly to abate the evil; but we load too heavily for the amount of iron there. If we could adopt a standard on all new work, the old cars would wear out and be gone in ten or twelve years. The sooner we commenced, the sooner it would be done.

Mr. Garey said that years ago, on the New-York and Harlem street-cars, 8 by 2 inch bearings had been used, and the axles broke. One only broke in the centre; all the others on the outside of the wheel. He changed to $5\frac{1}{2}$ by $2\frac{1}{4}$ journals and used the tapered axle as shown in the drawing, and not a single axle had broken in horse-cars since. Used no shoulder. The shoulder had an undoubted tendency to destroy the axle.

Mr. Varney said axles on the Fitchburg road had been in use for twenty-five years, and none had broken. They had shoulders $\frac{1}{8}$ of an inch, and the axles were $3\frac{3}{4}$ thick in the centre. He thought the spring of the axle had preserved it. Ten years ago, he had adopted a longer and thicker journal.

The President said passengers were roused out of their berths at midnight because sleeping-cars had to be switched off on account of hot boxes and broken and defective axles. Hoped some plan would be discovered to do away with the evil.

Mr. Steinbach said he used 8-inch journals, and they did well.

Mr. Adams said his road now used steel-tire wheels in passenger equipment. It was too soon to give results, but he thought 150,000 to 200,000 miles would be their average life. Some which had run 60,000 to 70,000 miles, showed no signs of wear; 50,000 was a good mileage for an ordinary chilled wheel; 60,000 was a large mileage; but a wheel running 50,000 miles was an extra good wheel, and that amount of service was all we could expect from it.

Mr. Jones indorsed what had been said about Mr. Garey's axle.

Mr. Davis said he did not believe in lengthening the journal unless the thickness was also increased. He recommended journals $5\frac{1}{2}$ inches long and $3\frac{1}{4}$ inches thick. He used $5\frac{1}{2}$ by 3, and had no broken axles, but the iron was of the best quality. Passenger-car axles were not allowed to run more than a year. They were then put under freight-cars, in which service they did not break.

Mr. Ramsey then offered the following resolution, which was agreed to:

Resolved, that it is the opinion of this convention that the shoulder hitherto used upon car-wheel axles for the purpose of staying the wheel at a certain place be abandoned, as it is a detriment, and no benefit.

Mr. Adams said that a uniform standard axle ought to be agreed upon, especially for roads whose cars were sent thousands of miles away, as it would save thousands of dollars to railroad companies and shippers of freight, and avoid the inconvenience of making repairs whenever a break-down occurred.

On motion, the further discussion of the subject was postponed until to-morrow.

The Committee on Brakes, consisting of Messrs. R. S. Ramsey, Joseph Jones, and Hugh Gray, announced that they deemed it inexpedient to make any report until after the trial of the steam brake which was to be made on Friday by the St. Louis and Iron Mountain Railroad.

The Committee on Links and Pins had no formal report ready.

Mr. Davis suggested that passenger trains generally had too much slack between the cars, and would recommend a uniform length of coupling and less slack, especially where the air-brake was used.

Mr. Nickerson, of the *Railroad Gazette*, presented a report on Narrow-Gauge Cars, which was received and ordered to be placed on file.

The Committee on Light-Weight Freight-Cars had no report to make with reference to a resolution adopted at the last annual meeting at the suggestion of Mr. C. A. Smith, recommending that each master car-builder construct a box freight-car of twelve tons capacity, and as light and strong as a durable car can be built.

SCALE OF PRICES FOR DAMAGED CARS.

Mr. Ramsey moved that a committee of three be appointed upon the question of cars damaged on foreign roads, and that said committee report a scale of prices to apply in such cases.

The motion was seconded, and a discussion ensued, in which Messrs. Ramsey, Steinbach, Adams, and others participated, as to the basis upon which the damage could be determined. It was difficult to fix the value of a car of a given age. If ten years be assumed as the average life of a freight-car, it was manifest that a car seven or eight years old would depreciate more during the last two or three years of its life than during the first few years, and would not be worth one tenth of its first cost for each year remaining after a certain amount of service had been performed by it.

Mr. Leighton thought the adoption of a standard for castings and axles, would obviate the difficulty of making repairs, and the matter of settling damages would therefore be easier of adjustment.

Mr. Ramsey's motion was amended so as to increase the committee to five, in which form the motion was carried.

The President appointed as such committee Messrs. J. L. Hackathorn, John Kirby, D. Hoit, R. S. Ramsey, and F. D. Adams.

Adjourned to nine o'clock to-morrow morning.

SECOND DAY'S PROCEEDINGS.

The convention met on Thursday morning at nine o'clock, and was called to order by the chair. The reading of the minutes of yesterday's proceedings was dispensed with.

PLACE OF THE NEXT ANNUAL MEETING.

Mr. Adams moved that when the convention adjourns, it adjourn to meet in the city of New-York. A discussion followed, indicating, as the general sense of the convention, that a different place of meeting should be selected every year. The motion of Mr. Adams was amended by substituting the city of Boston in place of New-York, in which form the motion was carried.

On motion of Mr. Adams, it was resolved that a committee of three be appointed to make arrangements for the next annual meeting. The chair appointed as such committee, Messrs. W. E. Chamberlain, A. Gleason, and Osgood Bradley, Jr.

DEAD-WEIGHT.

Mr. Adams referred to the light freight-cars which were to be constructed the last year with a view to ascertain whether the dead-weight could be profitably or safely lessened, and said he believed none had been constructed. He desired to learn the views of members on the subject.

Mr. Varney said the box-cars on his road weigh from 8 to $8\frac{1}{2}$ tons, and he found that many cars on other roads weighed more. He wouldn't want to build light cars to be run in trains with heavy cars, as the light ones would get the worst of it. They would stand no chance in a train with heavy ones.

Mr. Adams said that narrow-gauge cars, weighing some 4500 lbs., were understood to carry as much as an ordinary car of the usual gauge. He took that statement, however, with a grain of allowance. He did not see how he could lighten the car below the present weight without weakening it. He agreed with Mr. Varney that, as a general rule, if cars were made lighter, they would be stove up when running in heavy trains. His opinion was, that we were now building cars as light as they could be built with safety.

Mr. Gray said he could not see where he could reduce the weight of his freight-cars. They weighed nine tons, and were none too strong for the heavy loads they carried.

Mr. McGee said he had given the matter considerable study to see if he could reduce weights any, but was satisfied he could not, if the cars were to do the work intended when they were built. He could build cars of lighter material, but would not be justified in doing so, if they were to be loaded as they are at present.

Mr. Davis said that lighter cars than those now in use were built twenty-five years ago, and some of them were still running; but he found that when they run with heavier cars, they got down. He now built heavier cars, and would be glad when all the light ones were gone.

Mr. Steinbach said this question had been argued a number of years, and he believed we must build cars as heavy as we were now doing for heavy work; but if lighter work was intended, they could be built lighter. His box-cars weighed nine tons. He believed in heavy cars.

Further discussion on this subject was then postponed.

OIL-BOXES AND JOURNAL-BEARINGS.

The report of the committee upon these subjects was again taken up.

Mr. Kirby moved to appoint a committee with instructions to issue circulars, asking questions, and from the answers thereto, compile a report, and present it at the next meeting.

Mr. Adams said it was desirable to draw out an expression from members *now*, as to the possibility of establishing a uniform axle and oil-box.

Mr. More said he hoped there would be further discussion as to uniformity in axles, oil-boxes, and journal-bearings for the 4 ft. $8\frac{1}{2}$ in. gauge. All knew the difficulty of making a change. It can't be done in a year; but it is desirable to make a commencement on new work.

Mr. Garey said he was opposed to any definite or final action on the subject at this time. He thought all the facts bearing upon it should be collected by

the committee, by means of circulars, and then maturely considered in committee. In that way, a valuable report could be presented next year. We can not afford to make a mistake in so important a matter. It might not be so hard to accomplish a uniformity as some supposed. The majority of all axles now made were 6 ft. 9 in. long, with journals 5½ by 3¼ in.

Mr. Davis said the circulars heretofore sent out by committees had not been answered so generally as was hoped. He thought the least that members could do was to answer the questions thus asked.

Mr. Kirby said the committees should do the work during the year, and all the members should help them. Then thorough reports could be made during the interim, and thus the time of the convention would not be wasted.

The President said he would like to hear the views of members upon the size of axles, as an indication of the size which would most likely be adopted or recognized as a uniform standard, when final action in regard to it should be taken.

Mr. Adams thought a standard should be adopted as soon as possible, so that all new work could conform to it.

Mr. Gray thought that we should not make axles any smaller. He was using axles which suited the requirements of his road. He did not think if a 5½ journal were adopted as a standard, he could conform to it.

Mr. Leighton thought the committee should also ask for the sizes of wheel-bit, etc., with breakages of axles, and the sizes of such broken axles, so that the best size, and the one showing least breakage, could be adopted. The car company with which he was connected had received during the last two years more orders for journals 6 inches long, and 3¼ diameter, than for any other size. For new roads which had not specified the size, they had during the last two years used no axles with journals less than 6 inches. These were in passenger-cars.

Mr. More thought that axles used years ago were too light; but the roads had increased them, and most roads were now satisfied their axles were heavy enough. Many roads had from two to five lengths of axles; also journals varying from 4½ to 7½ inches in length. He thought some size should be adopted, so that a car at San Francisco or any other place could have a new axle put in without delay.

Mr. Garey thought that uniformity was quite as important in other things. The axle was only one thing. In cars running so far, there should be a uniformity as to size and shape of oil-boxes, bearings, etc., so that no new patterns might be required in making repairs.

Mr. Holmes said there were more than a dozen different sizes of journals on his road, and more than twenty different brasses, pedestals, and oil-boxes. Had adopted journals 3¼ by 6 in. for new work. Had used Babbitt brass, Hopkins brass, and solid brass. Where journals were oiled properly, the Hopkins brass did best; but he was now using solid brass as a general thing, and it worked well. Hoped the committee would be appointed, and report at the next meeting, and we should be prepared to agree or not agree with the report.

Mr. Adams said the circulars should be issued as soon as possible, and moved to amend the pending motion for the appointment of a committee, so that instead of waiting until next year for the report, it should be prepared and published in the *Railroad Gazette* and THE NATIONAL CAR-BUILDER, at least three months before the next annual meeting, which amendment was accepted by Mr. Kirby. The original motion, as amended, was then agreed to.

The chair appointed Messrs. John Kirby, F. D. Adams, and D. Hoit as such committee, on car-axles, oil-boxes, journal-bearings, and centre-plates.

INTERCHANGE OF CARS.

The committee on this subject, consisting of Messrs. Hackathorn, Adams, Ramsey, Kirby, and Hoit, submitted the following report:

Any railroad company receiving the cars of other companies for the purpose of running them over its road, or otherwise using them, will be required to return the same in as good general condition as they were in when received; or if this be not done, the necessary cost of restoring them to such condition will be charged to the company so receiving, running, or using them. In order to prevent, when cars are returned, any question as to the condition they were in when they left the company's line to which they belonged, notice should be given by the company receiving them at the time they are received, of any particular thing that may be deemed as constituting a lack of fair condition. Any repairs made to through-cars while in the use or possession of any company must be at the expense of that company; and no claims for repairs to through-cars will be allowed. An exception will be made, however, as to wheels and axles, which, if broken by fair usage, all companies shall pay for new wheels or axles, less the value of the ones broken.

1st. All parties contributing cars shall keep such cars in as perfect order as possible.

2d. All other repairs required, through fault of a company when the cars are being hauled over its road, are to be made by and done at the expense of such company; and cars shall be closely watched and inspected at the terminus of each road or division; and when repairs are needed, they shall be permanently and thoroughly made.

3d. Each road is to deliver the cars to connecting road, in good running order.

4th. Whenever any company repairs such cars, of whatever brand or kind, such repairs shall be made in a permanent manner, and after the style adopted by the road contributing the cars; and when castings or other parts are made, to replace those broken or lost, they are to be made same as the originals. If forgings and buffers, or other parts are made, they shall be of the style and pattern of the original in the cars.

5th. In order to give good dispatch to movement of cars, it shall be the first duty of the car inspectors, as soon as the car arrives at a terminal station of any road, to see that it is in good running order, and ready to deliver, and in case the delivering and receiving inspectors disagree, as to the condition of a car, the case is to be immediately referred to the superintendents or their representatives.

6th. Each company is to treat such cars of other roads, when on its road, in reference to repairs, oiling, and packing-boxes, in same manner as its own are treated.

7th. In case a car under load, in transit, has defects that do not render it unsafe to proceed on its journey before being repaired, the inspectors may make a note of such defect, and such car will be received back in same condition, and may be receipted for in bad order; but all such cars shall be returned, without load, to the road on which the damage was done, for repairs.

8th. In case cars are destroyed on any other line than that to which they belong, it shall be the duty of the car-master of such road to immediately notify the car-master of the road owning such car, of the date of its demolition, giving the number and style of such car or cars, and trucks, whether of wood or iron.

9th. In settling for cars destroyed on any line other than that to which they belong, the cost of the car shall be taken, less the value of iron as scrap, and deduct ten per cent per year from that amount, and the balance shall be considered the value of the car destroyed. In case the demolition does not extend to the trucks, the trucks may be returned at a proper valuation. Respectfully submitted, and signed by the committee.

Mr. Adams said the report was drawn up by gentlemen of large experience in the practical working of the system of interchange of cars, and who knew the exact results of the suggestions it contained.

Remarks were made by Messrs. Wadlie, Kirby, Hackathorn, and others, conceding that if a wheel or axle should break, the road upon which the break occurred could replace the same, and charge the actual cost thereof to the road owning the car, less the value of the old axle and wheel, as scrap.

Mr. Wadlie thought the report should say something about the length of time cars were kept in shop repairing. Cars had been known to be gone from home a year and a half.

The report was then adopted, and the committee discharged.

On motion, it was resolved that the secretary of the association be instructed to send a circular to superintendents of railroads, together with a copy of the report just adopted, requesting the adoption of the same, by their respective companies.

COMMITTEES AND CIRCULARS.

The President then appointed the following committees, who are to issue circulars asking information upon the several topics named, and whose duty it shall be to report a summary or compilation of such information to the next annual meeting of this association:

On Heating, Ventilating, and Lighting Passenger-Cars.—Messrs. W. E. Chamberlain, V. D. Perry, and A. Gleason.

On Car Roofs.—Messrs. Ambrose Ward, C. A. Smith, and George Hackett.

On Truck and Car-Body Check-Chains.—Messrs. C. C. Millar, W. J. Coles, and J. M. King.

ELECTION OF OFFICERS.

The committee on the nomination of officers of the association to serve during the ensuing year, made a report recommending the reappointment of the present incumbents, namely:

M. C. Andrews, *President.*
M. P. Ford, *Vice-President.*
Leander Garey, *Secretary.*
A. Steinbach, *Treasurer.*

The recommendation of the committee was concurred in, and the gentlemen named were unanimously elected to serve during the current year.

Mr. M. N. Forney, of the *Railroad Gazette,* and Mr. Horatio Brooks, of the Brooks Locomotive Works, were unanimously elected associate members of the association.

The Committee on Finance made a report, fixing the assessment upon each member of the association to defray expenses of the current year at five dollars, which was agreed to, and the committee discharged.

The Committee on Models and Drawing made a report, calling attention to sundry models and drawings which had been presented to the convention, embracing numerous devices and improvements, and for which the convention make due acknowledgment to the donors.

The Committee on Circulars submitted a series of questions to be embodied in the circulars to be sent to members by the secretary. No formal action was taken thereon, and the reporter deems it unnecessary to recapitulate them.

The Committee on Communications presented letters from the following master car-builders, regretting their inability to be present:

Benjamin Welch, Central Pacific R.R.
W. A. Morgan, Virginia and Tennessee R.R.
W. H. H. Price, Evansville, Henderson, and Nashville R.R.
I. W. Van Houten, Pennsylvania R.R.

Also a communication from A. W. Soper, Esq., Superintendent of the St. Louis and Iron Mountain Railroad, stating that he was authorized by the President, Hon. Thomas Allen, to invite the members of the convention to visit Pilot Knob on a special train.

The communications were received and placed on file.

THANKS.

On motion, the following resolution was unanimously adopted:

Resolved, That the thanks of the Master Car-Builders' Association be tendered to W. W. Wagner, Esq.,

President of the New-York Central Sleeping-Car Company, for the use of the new and elegant drawing-room coach, "City of Toledo," which he courteously placed at the disposal of the Eastern delegates to this convention; also to the officers of the New-York Central and Hudson River, Lake Shore and Michigan Southern, Toledo, Wabash, and Western, and the Chicago, Alton, and St. Louis Railroad Companies, for their kindness in passing said car over their respective roads; also, to all other roads which have conferred their favors on the delegates attending this convention; also, to the merchants and manufacturers of St. Louis, who organized the pleasant programme for our entertainment; also, to Hon. Thomas Allen, President, and A. W. Soper, Superintendent of the St. Louis and Iron Mountain Railroad, for their liberal tender of a special train to convey us to Pilot Knob and Iron Mountain; also, to the proprietors of the Southern Hotel for the satisfactory accommodations afforded by them to this convention; also, to the press of St. Louis, for their courtesies and attentions; and to the *Railroad Gazette* and THE NATIONAL CAR-BUILDER, for their efforts to advance the interests of this association.

DECEASED MEMBERS.

The following preamble and resolutions were unanimously adopted:

Whereas, God, in his inscrutable providence, has taken from among us during the past year, and since our last meeting, our respected friends and brothers, William Waddington, of the Pittsburg, Fort Wayne, and Chicago Railroad, and C. D. Mills, of the New-York Central and Hudson River Railroad; therefore

Resolved, That we, as members of the Master Car-Builders' Association, do hereby tender our sympathy to the afflicted families of the deceased, in the sad bereavement sustained by them in the deaths of our efficient and beloved brothers, in the earnest hope of a happy reunion in the world to come.

Resolved, That our secretary be requested to send a copy of these resolutions to the families of our deceased brothers.

The committee on the subject of a monument to the memory of Mr. J. R. Chiles, late of the Chesapeake and Ohio Railroad, reported progress. Report received, and committee discharged.

A discussion took place in regard to the expediency of appropriating $100 as a prize for the best drawing to be presented at the next meeting. Subject laid on the table.

On motion, the convention then adjourned to meet at Boston, Mass., on the second Wednesday in June, 1873.

Railway Master-Mechanics' Association.

THE fifth annual convention of the American Railway Master-Mechanics' Association assembled in Horticultural Hall, Boston, Tuesday, June 11th. The attendance was larger than at any previous meeting.

The convention was called to order by the President, Mr. H. M. Britton, of Cincinnati, of the White Water Valley Railroad. The minutes of the last annual meeting were approved, and the roll of members was called by the secretary, Mr. J. H. Setchel, of Cincinnati, of the Little Miami road, after which a number of gentlemen joined the association.

Mr. Britton then made a brief opening address, in which he congratulated the members on assembling for the holding of the fifth annual convention, and thanked the association for electing him President from its formation, and expressed the hope that some other member might be selected to serve for the ensuing year.

The report of the Treasurer, S. J. Hayes, of Chicago, was then presented, showing receipts of $1470, expenditures $1411.35, and a balance of $58.65 in his hands.

BOILERS AND BOILER MATERIAL.

A paper prepared by the committee, of which Mr. Hayes, of the Illinois Central road, was Chairman, upon "Boilers and Boiler Materials," was then read by the secretary.

The report gave opinions from many prominent master-mechanics, as well as the result of experiments made by the committee, leading them to the opinion that no American iron is equal to the Low Moor iron for boilers, and that drilling the rivet-holes shows a strength of 4160 pounds greater than if the holes are punched. They recommend the use of $\frac{3}{4}$-inch rivets, and hollow stay-bolts of iron for furnaces. The report was accepted, and a discussion on the subject was then had. Mr. Hayes, the chairman of the committee making the report, expressed the hope that the master mechanics would give their views, as the committee had taken much trouble in their experiments with boiler-plates, and they wanted to have the experience of others. He said the committee had tested the iron of the same grain, the pieces being taken from one sheet and the test being made lengthwise of the sheet. He explained that after a plate had been punched, the use of a microscope would reveal that all around the holes there would be stars, showing the injury to the grain of the iron, and this had led the committee to recommend the use of drilled plates for those parts of the boiler where the greatest pressure came, and have the others punched.

An interesting discussion followed, on the merits of Low Moor, Sligo, and Bowling iron; and also on the comparative merits of iron and steel fire-boxes. A number of gentlemen participated, the majority seeming to favor steel, in preference to iron, fire-boxes.

On motion of Vice-President Chapman, of Cleveland, Ohio, a committee of five was appointed to suggest subjects for discussion at the next annual convention.

SECOND DAY'S SESSION.

The discussion was resumed on the subject of boilers and boiler-material.

The secretary gave some estimates of the relative cost of each method, and favored the drilling process as giving more strength. He thought that this would not increase the cost of a locomotive boiler more than $25.

Mr. Forney thought the question of cost in this matter was a very small one. His experience and observation indicated that more boilers gave way in the rivet-holes than at the seams, and that this was far less likely with drilled than punched holes.

Mr. Hudson, of the Rogers Locomotive Works, favored the plan of drilling, as did also Mr. Gregg and Mr. Brown, of the Erie, all upon the ground of greater strength.

Mr. Philbrick, of the Maine Central, had found always, in case of disaster, that there seemed to be a previous weak point in the boiler, in some of the stays and seams. Mr. Hayes, of the Illinois Central, again spoke in favor of drilling; for as a riveted edge was ordinarily only about 56 per cent as strong as the rest of the iron, every thing possible should be done to equalize the strength. Mr. Eliot said it was of little consequence *why* a rivet sheared quicker in a punched than a drilled hole. It was only necessary to know, from the experiment made, that the latter gave 30 per cent the most strength. Mr. Hudson had not been fully convinced that so much additional strength was obtained. He thought favorably of "butting" instead of lapping the plates, and then riveting wide stays upon both sides.

The next question was in regard to the thickness of flue-sheets in coal-burning locomotives, the committee recommending $\frac{7}{16}$-inch, if of iron, and $\frac{5}{16}$-inch, if of steel.

In regard to the material and construction of locomotive-boilers, the committee only recommended one change—the adoption of hollow stay-bolt iron instead of solid—as a break would be instantly detected. These might be plugged on the inside to prevent the admission of cold air. Some three or four gentlemen favored the change.

The report and discussion on boilers and boiler-material was then closed, and a vote of thanks passed to the committee on that subject.

The next business in order was the report of the committee upon the relative merits of the straight and wagon-top boiler. Some three hundred letters of inquiry had been sent, and about fifty answers had been received, various in character, preference, and reasons therefor. One of these letters, from Mr. Towne, of the Hannibal and St. Joseph Railroad, was read to the meeting.

After some discussion on the subject-matter of the report, a vote was taken, when it appeared that 28 members were in favor of wagon-top boilers, and 13 in favor of the straight top, on eight-wheel engines.

Mr. Coleman Sellers, of Philadelphia, an associate member, was invited to read a paper upon mechanical engineering, which he did, the "Self-acting Slide Lathe" being the principal topic treated. The paper was very interesting, and at its conclusion a vote of thanks was tendered him.

The committee on topics for discussion at the next annual meeting reported a list, including twelve questions of importance to railway mechanics, which was adopted.

A motion was made to so amend the constitution as to admit as members two instead of one mechanical engineer from each locomotive establishment in the country, and this was adopted.

The committee appointed last year to investigate the subject of boiler incrustations made a report.

The next report in order (that on steel tires being omitted) was that upon the best method of securing driving and truck-brasses. The report was made up of the results of correspondence, and many methods were suggested and recommended.

There being no report presented upon the construction of tender-trucks, the committee upon the question, "Is there any material or device for packing stuffing-boxes more economical than hemp?" presented its report. It seemed, from the correspondence received, that soapstone and metallic packing had been used, but that nothing was found to supersede hemp. The committee suggested the continuance of the subject another year.

A report was made upon the subject of a uniform system of computing mileage of engines doing switching service, recommending that six miles per hour be the rate of computation, and six per cent of the total distance run, for the switching service of engines doing a freight business.

THIRD DAY'S SESSION.

The report on the mileage of engines was again taken up, and, after being discussed, the recommendations of the committee were adopted.

Mr. Setchel then offered a resolution directing the secretary to communicate the action of the convention to the Association of Railway Superintendents, and asking their coöperation in forming a uniform system of computation.

A report on the application of compress-brakes was then read, having been prepared by Mr. Mitchell, of Delano, Pa. This gave the opinions of many railroad mechanics as to the various kinds of brakes in use; but there was a great diversity of opinion, few agreeing as to the excellence of any particular one. The committee recommend that the braking-power be placed under the control of the engineer, but at the same time they would not on any account dispense with the hand-brake or the brakeman.

Some discussion followed, in which several members favored the Westinghouse air-brake as making a great saving in the use of wheels; but they would not at the same time give up the hand-brake.

Mr. Glass, of Pittsburg, Pa., spoke of a vacuum brake which was being tried on the Alleghany Valley road, and explained it, stating that a heavy engine, 35 tons, and a train of six cars, going at the rate of thirty miles an hour, had been brought to a dead stop in less than three hundred feet; and it was to be attached to the train by which the association were to be conveyed to New-Hampshire on Saturday.

Mr. Gordon H. Nott, a mechanical engineer of Bos-

ton, and an associate member of the association, read a paper on the use of fuel for generating steam.

The committees were then announced, with the subjects to consider, to be reported on at the next annual meeting.

The report of the committee on boiler-incrustation, one of the most lengthy presented to the convention, was then read by the secretary.

Messrs. Lauder and Studley, of Concord, N. H., and G. S. Griggs, of Worcester, were appointed a committee to consider and report on the subject of steel tires, wheels, and axles, to the next convention.

On motion of Mr. Gregg, of Pa., the thanks of the convention were presented to Messrs. Towne, of Hannibal, Mo.; Boon, of Fort Wayne, Ind.; and Johann, of St. Louis, Mo., for their very able report on boiler incrustation, and the new committee on the impurities in water was instructed to correspond with the Institute of Technology in relation to the analyzation of water.

Mr. Towne presented specimens of incrustations which had formed in boilers on the Hannibal and St. Joseph road, and explained the trouble he had from the impure water, more especially from the mud, and he also exhibited a model of a purifier which he had designed, and was using on the engines on his road. This did not prevent the incrustation, although it modified it considerably.

Mr Robinson, of Hamilton, C. W., thought much depended on the material of which the tubes were made, as on the Great Western road they had been in the habit of using copper and brass until they had a lot of new engines delivered which had iron tubes. As he had found these to incrust, he had gone back to brass, for that he found to be preferable.

The report of the comparative performance and cost of operation of eight and ten-wheel engines for freight service was next read, the committee arriving at the conclusion that the eight-wheel engines could be run at much less cost for the same work than the ten-wheel.

The comparative performance and cost of operation of ten-wheel engines, with six drivers coupled, and eight-wheel engines, with four drivers coupled, was next reported on, the committee stating that the Mogul engines, these being the eight-wheel, can be run for 33 per cent less than the others, and they recommend them as being best adapted for freight work.

The committee on safety-valves made a report, in which they recommended the Richardson valve, in connection with one of the old styles, the former to be arranged so as to be out of the control of the engineer, and the latter to blow off steam at stations.

Professor F. B. Miles, of Philadelphia; R. H. Thurston and Henry Morton, of Hoboken, N. J.; O. H. P. Little, of Indianapolis, Ind.; and Jerome Wheelock, of Worcester, Mass., were chosen associate members.

The report of the committee on "Boiler Explosions" was read by the secretary. The conclusion reached by the committee was, that many of the explosions were caused by the use of impure water, but that most of the explosions could not be accounted for. The report was laid on the table.

The report of the committee on a "uniform system of the promotion of firemen to engineers, and the establishment of grades of engineers," was read by the secretary. The committee find that promoted firemen are preferred to men promoted from shops. There is already a system of grades of engineers, based upon length of service. The subject was discussed at some length.

A fund was raised to be offered as a premium for the best design of apparatus for removing snow from railway tracks and for supplying locomotives with fuel and water. The election of officers was by a unanimous vote postponed for one year, the officers of last year holding over.

A resolution of thanks to the president for the manner in which he had discharged his duties was unanimously adopted, after which the convention adjourned, to meet at Baltimore on the second Tuesday of May, 1873.

Car-Shop Notes.

GILBERT, BUSH & CO., TROY, N. Y.

THE car-works of this well-known firm are situated on Green Island, opposite the northern limits of the city of Troy, and separated from it by the main volume of the Hudson River. The establishment has been in successful operation many years, and the name of the firm is identified with the business of car construction from its first rude beginning, when a railroad was a novelty, and land traveling by steam was considered an innovation dangerous to the usefulness and perpetuity of the great canal system.

The extent and capacity of the works have increased with the growth of railways, with a corresponding change in the kind and quality of vehicles turned out from year to year, one improvement following another, and new devices superseding old ones, until, skipping over what is intermediate, we are able to contrast the primeval car of the stage-coach pattern in vogue thirty-five or forty years ago, with the present palatial drawing-room or sleeping-coach, replete with all the modern hotel accommodations, except billiard-room, bowling-alley, and elevator. The contrast is ludicrous, but no more so, perhaps, than an old-time excursion by rail from Albany to Schenectady, as compared with a modern one from New-York to San Francisco.

The various buildings, including car and machine-shops, foundry, offices, etc., are of brick, substantially constructed, and combining all the necessary facilities required for transforming the raw material of wood and iron into railway cars of every class, finished and complete for the track. The works have a convenient and ample dockage on the western side, for the shipment of cars, or receiving of lumber and other material. They are also intersected with numerous tracks in connection with transfer-tables and other appliances for the convenient handling and transfer of cars from one part of the premises to another. The capacity of the works is equal to the turning out of an annual average of one thousand cars, including all kinds, a good proportion being passenger-cars.

The machine and wood-cutting shops are driven by an engine of 120 horse-power, the fuel for heating the boilers being mostly supplied from the last-named shop by means of a device which is worthy of special notice. The chips and shavings, as fast as they are made by the planers or other machines, do not accumulate or fall upon the floor even, but instantly disappear in the mouth of a tube, or passage, adjusted over the central part of the machine, and are whirled off to the fire-room by a powerful current of air kept in motion by exhaust-fans. These fans are, of course, some tax on the power; but this is offset by the obvious advantage of keeping the floors clear of rubbish without undue accumulation, or other means of handling it. The usual quantity of dust is also greatly diminished, and the ventilation improved. Now and then, however, a workman gets his head too near the suction orifice, when his hat, if it is not on pretty tight, unceremoniously disappears, and arrives in the boiler-room in a twinkling. This department of the works is supplied with the usual complement of machines for iron and wood-work, sawing, planing, boring, mortising, lathes, and so on, including a powerful hydraulic press for wheel-fitting. The machine-shop was seriously damaged by fire a few months ago, and many of the machines had to be repaired or replaced by new ones.

In the car construction department, at the time of our visit, a variety of cars for passenger and freight purposes were in progress, embracing every stage, from the mere skeleton or frame, to the freshly-painted vehicle ready for delivery. A great many of the celebrated Wagner drawing-room coaches have been built at these works, and the experience and skill of Messrs. Gilbert, Bush & Co., in their construction, have largely contributed to establish their reputation, by carrying into practical effect the various improvements made from time to time by the inventor. Two new ones were in the paint-shop, ready for delivery. They were built for the New-York Central and Hudson River road, and embody all the latest features and improvements of this style of coach. Their length is 54 feet, exclusive of Miller platforms. The interior finishing is elegant and tasteful, and combines a variety of choice woods, including black-walnut, rosewood, and mahogany. The central saloon contains 16 revolving chairs, upholstered with crimson plush. There are also a family-room, two state-rooms, and the usual wash-room and closet. Both cars have eight central lights or chandeliers, and are provided with Howard ventilators and Baker heaters. They are named "Poughkeepsie" and "Weskora" respectively, and are now doing active duty on the above-named road. We also noticed 12 day-cars of the ordinary style, which were being built for the same road.

There were also in the shops a number of passenger-cars in progress, and designed for shipment to foreign parts. No oak timber is used in their construction, but in its stead, and especially for the more substantial part of the framing, southern yellow pine is used. These cars, for the convenience of shipping, are framed so they can be put together in sections. After they are completed, and the finishing coat of paint has thoroughly dried, they can, by taking out a few screws, bolts, and pins, be unjointed and folded up as compactly, or nearly so, as an Arab's tent, put on board a ship, and, on reaching their destination, be put together again with scarcely a visible trace of the previous dislocation. Considerable freight-work was also in hand, embracing the usual variety of this class of rolling stock. A number of these were for foreign account, and framed so as to be taken apart and packed for shipment.

The foundry department is provided with all the facilities for the manufacture of every species of casting required for the construction of cars, except the wheels, some of which are of the well-known English "Mansell" brand.

The combustible nature of the materials in car-shops renders necessary the greatest vigilance in guarding against fire, and the most effective means for arresting it when once started. The provisions for such a contingency at these works would seem to be adequate for any emergency. A tower, fifty feet high, contains a reservoir holding 35,000 gallons of water, and which is kept replenished by means of a powerful steam-pump. The elevation is such as to secure a sufficient pressure for flooding any considerable portion of the premises, and especially the construction and paint-shops, which contain a number of hydrants, located at convenient distances, with hose attached, and in readiness for action at a moment's warning. These precautions, in connection with good watching, ought to prevent in these shops any repetition of the disasters which have recently occurred elsewhere.

Between the shops and the docks, on the western side, is located the lumber-yard, containing an ample stock of every kind of seasoned lumber required in the business. Canada and Michigan are the chief sources of supply for most kinds, except the southern pine, which comes from Florida and Georgia. This latter is a most valuable timber, and is coming more and more into favor for car-building purposes, and especially as a substitute for oak. The further south it is grown, the more it abounds in resinous matter, which gives it solidity and durability, and protects it from the ravages of insects, which in some climates prove so destructive to many kinds of timber, and oak particularly.

We have now briefly touched upon all the prominent features of this establishment, except the number of workmen employed, which we omitted to make a note of. Did our space permit, we could have gone more into details, but we have said enough to give the reader a general idea of its extent and capacity. The operations are carried on so quietly, and with such system and regularity, that one can hardly realize how so much can be done, and done so well, with so little apparent exertion, and so little noise and turmoil. We take pleasure in acknowledging the courtesy of the senior partner, Mr. Gilbert, and also the kind atten

tions of his son, in conducting us through the works, and explaining to us the many points of interest.

RENSSELAER AND SARATOGA SHOPS.

This road is now a division of the Delaware and Hudson Canal Company, having been leased by that corporation. Its shops are also on Green Island, about half a mile north of the works of Messrs. Gilbert, Bush & Co. They are not yet in operation, but will be in readiness to begin work in a month or two. The buildings are of brick, entirely new, and of such magnitude as to indicate the doing of a large business in the construction of cars and locomotives. So far as the machinery has been put in, it is evident that the fitting up will be very thorough and complete. Some of it is sufficiently ponderous for the heaviest work, and all of the newest and most improved description. We hope to be able, in a future number of THE CAR-BUILDER, to give a full description of these works.

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Editorial Announcements.

CORRESPONDENCE.—*We cordially invite the coöperation of the railroad public in affording us the material for a good mechanical paper. Articles relating to rolling stock and machinery, by those practically acquainted with those subjects, will be gratefully received. All communications must be addressed to Vose, Dinsmore & Co., No.* 1 *Barclay Street.*

The name and address of the writer must accompany all communications designed for publication.

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The St. Louis Convention.

THE attendance of master car-builders at St. Louis, on the 12th ultimo, was a very fair one in point of numbers, in view of the fact that their meeting was held simultaneously with that of the master-mechanics at Boston, and only a few days previous to the great outburst of international melody at the Coliseum in the same city. These two last-named assemblages, one representing important railroad interests, and the other presenting attractions of a novel and peculiar kind, would of course interfere more or less with the convenience of those desiring to go to St. Louis. In spite of these drawbacks, however, a goodly number of old members were present, and there was also a very gratifying accession of new ones, a circumstance which indicates a growing interest in the objects and purposes of the organization, and gives assurance of its future prosperity.

The report of the proceedings, which we give in our present number, was prepared specially for THE CAR-BUILDER, by Mr. A. L. Butler of Chicago, assisted by Mr. C. D'W. Gibson of St. Louis, who have charge of our agencies in these two cities respectively, and who are well known in Western railway circles. It is the only reliable report published, much care having been taken to give a correct abstract of what was actually done, and a synopsis of the discussions.

The business transacted involves but little final action upon any one subject, but is in the main preparatory, with a view to future results. We regret that the reports of the special committees on sundry important topics are not more full and complete. Hereafter it is to be hoped that every committee will not fail to make a formal written report, embodying such information, be it more or less, upon the subject assigned to them, as they may be able to procure. It is unnecessary for us to recapitulate what is contained in the proceedings. We may mention, however, the change in the title of the association, which we think is a great improvement, and trust it will be permitted to remain as it now is. The "Dictionary of Terms" is a most important matter, and, when completed, as it will be by labor and persevering effort, it will repay ten-fold all the outlay of time bestowed upon it. There was an interesting discussion on oil-boxes and journal-bearings; the dead-weight of freight cars; the interchange of cars; and the necessity of fixing a basis for determining the value of cars damaged or destroyed on lines of road to which they do not belong.

These subjects, and many others, including ventilation, heating, lighting, car-roofs, check-chains, etc., were placed in charge of appropriate committees, with instructions to procure information by mea s of circulars and otherwise, and report the same to the next annual meeting, at Boston, on the second Wednesday in June, next year.

Master-Mechanics' Convention.

OUR space enables us to give but a comparatively brief summary of the proceedings of this convention, made up from the reports contained in the Boston papers. It is sufficient, however, to convey an idea of the business done, and the range of topics discussed. The attendance was good, and much valuable information was elicited upon various subjects pertaining to the mechanical departments of railways. When the official report of the proceedings is received, we shall give our readers some selections from the reports of committees, and also such portions of the discussions as our space will permit.

The New Detroit Car-Works.

THE extension of railways within the past two years, and the increase and activity of the general traffic, have imparted a corresponding stimulus to the business of car construction, which has already taken rank among the great industries of the country. Among the new enterprises of this kind recently started is the Detroit Car-Works, a company organized four or five months ago at Detroit, Michigan. An eligible piece of ground was purchased, bordering on the river, and affording convenient dockage—the entire area comprising about seven acres. The construction of the necessary buildings was immediately commenced, upon the most approved plans, after a careful examination of the best shops in the West. Every convenience that experience can suggest will be provided, and all the facilities afforded by the latest and most improved machinery for turning out work with economy and dispatch will be made available. The works are in such a state of forwardness that the building of cars will be commenced during the present month. Their capacity will not at first exceed four cars per day, but will be increased to any extent which the business may in future require.

Mr. D. Sutherland, long and favorably known as the master car-builder of the Lake Shore and Michigan Southern shops at Buffalo, has accepted the position of superintendent. A better selection could hardly have been made. His experience in his former position, characteristic energy, and thorough practical knowledge of the mechanical details of the business, are sufficient guarantees of success.

Car-building is essentially progressive. New devices and appliances are constantly being brought into requisition. Old methods must be laid aside the moment they are fairly superseded by new and better ones. Mr. Sutherland is fully identified with the progressive spirit in this department of mechanical industry, and is quite capable of maintaining a fair and successful competition with others in the same field. We predict for the new enterprise a prosperous career under his management.

The directors are George H. Russell, E. C. Walker, and A. H. Leavitt. E. C. Walker is President and Treasurer, and G. H. Russell, Secretary.

In a future number of our paper, we hope to give a more particular and detailed notice of the works from a personal inspection of them, not having, at this time, the necessary data for doing so.

Star-Metal for Journal Bearings.

THE superiority of this composition for railway-car journals, in the essential requisites of utility and comparative cheapness, has been demonstrated by scientific experiment, as well as by practical test, on a number of roads in various parts of the country. It is a dense, granulated metal, having no lead in it, and altogether unlike the ordinary Babbitt-metal hitherto so much in use, being thirty per cent lighter in weight, with far less liability to melt, and will last a quarter longer than Babbitt or brass-filled bearings, and ten per cent longer than gun-metal or the most expensive brass. It fuses at a temperature of about 1400° Fahrenheit, and has no affinity whatever with iron or steel; does not adhere to it either hot or cold, and consequently does not cut the journal. It has about the same hardness as ordinary brass, but does not heat as readily, and is twenty per cent lighter. The wear upon the journal is less than that of any other bearing, and the consumption of oil proportionately less. The net cost, as compared with that of other bearings in common use, may be estimated as follows: An ordinary brass bearing, weighing 8 pounds, finished for use, at 28 cents per pound, costs $2.24. A brass Babbitt-filled bearing of same pattern, finished, weighing 8 pounds 4 ounces, at 28 cents, costs $2.31. Gun-metal, (Detroit brass,) same pattern, finished, weighing 8 pounds 3 ounces, at 40 cents per pound, costs $3.27½. Star metal, same pattern, finished, weighing 7 pounds 3 ounces, at 32 cents per pound, costs $2.30.

The result would seem to be decidedly in favor of the last-named metal as regards cost and all desirable qualities. It is cheaper, lasts longer, has the requisite hardness, less weight, does not wear or cut the journal, is less liable to heat, and consumes less oil. We are inclined to think this estimate of the merits of the article is not an exaggerated one, as our information is derived from a source that we deem reliable. Believing that the above are simply the facts of the case, we have no hesitation in recommending this composition to our readers as worthy of a fair trial, at least, upon all railway-car journals. The Star-Metal is manufactured by the Western Star-Metal Company, 17 South Canal street, Chicago.

MR. LEVI L. LOCKWOOD, formerly purchasing agent of the Erie Railway Company, has been reappointed to that position in place of George C. Hall, deceased. The experience and acknowledged ability of Mr. Lockwood in this important department will render him a valuable acquisition to the service of the road.

SEVERAL interesting articles, prepared for insertion in the present number of our paper, have been crowded out by Convention proceedings; among others, a detailed description of the machine and car shops of the New-York Central Railroad at West-Albany, which will appear in our next number.

MR. GEORGE FORSYTH, having charge of the wheel-lathe for turning locomotive steel tires in the Lake Shore and Michigan Southern shops at Elkhart, Ind., turned a shaving 217 feet long and ⅛ inch in diameter in 40 minutes. It weighed 3 pounds, and is supposed to be the longest ever turned.

Indiana Car Company.

CAMBRIDGE CITY, IND., June 1, 1872.

EDITOR OF THE NATIONAL CAR-BUILDER:

DEAR SIR: The Indiana Car Company, which is located at this place, was organized a little more than a month ago. It commenced its existence then as an entirely new and distinct company, with a capital of $50,000, and is in no way connected with the late Cambridge City Car Company, whose site it occupies at present, and whose machinery and fixtures it purchased. The works have a capacity of five cars per day, and are quite conveniently located in the centre of the town and near the junction of the many roads that intersect at this point. They comprise several substantial brick and frame buildings, and occupy, in all, an area of three acres. The principal building, and that in which the office is located, is situated on the corner of two broad streets, and is very accessible. It is built of brick, and is three stories high. The upper story is used by the Masonic Brethren of Cambridge City, but the first and second floors are occupied by the company; the former, as an apartment for wheel-fitting, is well equipped with the tools required, including boring-machine, axle-lathes, and one of the most complete hydraulic wheel-presses in use. The second floor of this building, together with the main floor of the building adjoining, is occupied by the machinery required in dressing timber. The basement of the north wing of the establishment is used as a machine-shop, and is equally well supplied with every tool essential to the work. In the rear of the machine-shop is the boiler-room and engine, which is of forty-five horse-power, and comparatively new. In the rear of the engine and boiler rooms is the blacksmith-shop, running nine fires, besides bolt and arch-bar furnaces. The blacksmith-shop is the only frame building in the immediate vicinity. To the right of this, and set back 100 feet from the main building first mentioned, is the foundry, 50 × 70. It is used only for light castings; but as the company are already at work constructing a new and larger foundry, they will soon be able to turn out their own wheels. On the opposite side of the street, and west from the main building, are two frame buildings used as joining-shops, while on the company's ground, south of the premises already referred to, are now being erected sheds for shelter in setting up work that will accommodate nine cars at a time. This will enable them to more than double their present capacity, which is four cars per day. The company are now employing 125 men, but of course this number will be greatly increased as facilities are gained for applying more labor.

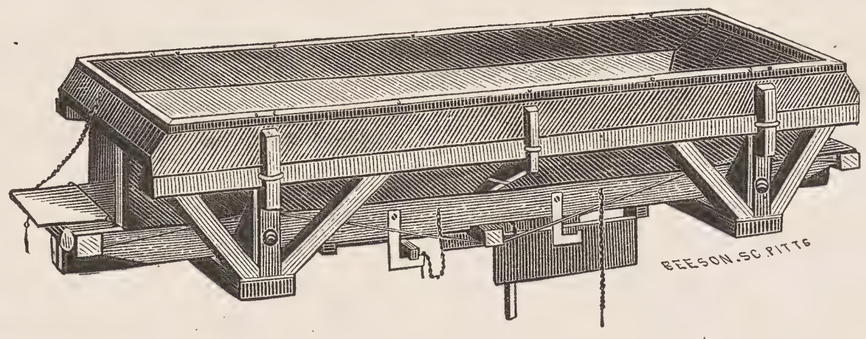
The city authorities have presented the Indiana Car Company with fifteen acres of valuable and well-located property, and it is the company's intention to erect, at an early day, entirely new and commodious works, and in that case, Cambridge City can boast of as extensive an establishment for the manufacture of cars as there is in the country.

The officers of the company are as follows: Jethro Mitchell, President; William McMillan, Vice-President; Warren Currier, Secretary; John McMillan, Treasurer and Manager; D. D. Shields, Superintendent.

INDIANA.

THE Michigan Central Railroad has recently made a trial on one of its locomotives of a new compressed air-brake invented by Mr. Thomas O. Ward, of Detroit. The trial was satisfactory in regard to the capacities of the brake, and even exceeded expectations. Its general method is similar to that of all atmospheric pressure brakes, but its action, arrangements, and connections are very dissimilar. It claims to be an improvement upon the Westinghouse brake, although its general principles are in the main identical with it.

THE car-shops of W. J. Quealy and Sons, at Hannibal, Mo., were recently destroyed by fire, together with machinery, stock, and a number of new cars.



Improved Coal and Freight-Car.

THE cut illustrates an improved freight-car recently patented by Mr. I. G. Macfarlane, of Wilkinsburg, Allegheny County, Pa., and designed mainly for the transportation of coal, although it can be used to advantage for other freight, such as railroad iron, lumber, oil, etc. It is cheap, light, and strong in its construction, weighing a ton less than the ordinary 8-wheeled coal-car, and requiring less material and labor in the building. It is also equally convenient for dumping or shoveling out coal, coke, ore, lime-earth, or other freight of a like character, having a sufficient pitch in dumping to deposit its contents along the whole distance between the trucks, and inside the truck.

Its form approximates a half octagon, the largest timbers passing through its whole length directly behind the "dead woods." Two pairs of doors extend the entire length of the bottom between the trucks, and there is also a door at each end opening downward, and affording convenient access to the bottom for shoveling if desired, or for loading or unloading heavy freight. There is no interior fastening for the doors, but a cross-bar beneath instead, thus leaving the inside unobstructed. Further particulars may be obtained by addressing the patentee as above.

Miscellaneous Items.

A SPECIAL train was recently run on the New-York Central Railroad, from Rochester to Syracuse, a distance of 81 miles, in 88 minutes, making one stop of 6 minutes. The train actually run 81 miles in 82 minutes. The engine had 16 × 24 cylinders, 5 ft. 6 in. drivers, and was made at Schenectady. The engineer was Mr. James Wood.

THE Brooks Locomotive-Works, at Dunkirk, have contracted for the building of seventeen locomotives for the United States Rolling Stock Company.

THE Schenectady Locomotive-Works will soon commence the building of forty-three locomotives for the New-York Central and Hudson River Railroad.

THE St. Albans *Messenger* says, "We saw a car-load of paper car-wheels at the depot on Tuesday, which were consigned to Detroit. The paper, which is as compact as metal, is inclosed in iron plates, the whole being firmly bolted together, and the tires and flanges are of steel. They weigh about the same as iron wheels, and are apparently models of strength and durability. They are manufactured by the American Paper Car-Wheel Company, at Pittsford, Rutland County, Vt.

THE managers of the railroads leading from Chicago to New-York propose soon to run trains through in twenty-four hours. The trains will consist of a locomotive and three mail-cars. The largely increasing amount of mail matter demands this extra effort, and it will be undertaken at all hazards. Cars are now building for the trains. They will be fifty feet long, and specially adapted for fast running. Stoppages will be made only to obtain coal and water; yet to accomplish this distance, (962 miles,) over 40 miles an hour will have to be made.

AT present there are eighty Pullman palace-cars arriving and departing from Chicago every day. The amount of money expended in their manufacture ranges from about $10,000 to $30,000 for each car, the average cost being about $16,500. The amount of capital, therefore, invested in the Pullman cars which accommodate the business of Chicago, amounts to about $1,300,000.

THE Harrisburg Car-Works are getting along well in rebuilding. The construction-shop is 60 x 200 feet; a large wood machinery-shop of brick, two stories, iron machinery-shop, 60x150 feet; foundry, 62x150; No. 2 erecting-shop, 60x200; repair-shop, 40x100. 450 men now comprise the entire working force, and within a few weeks will be running at full strength.

A TENNESSEE electrician claims to have invented a device for propelling railroad cars by the power of electricity. He claims that a speed of one hundred miles an hour can easily be attained. A committee of scientific gentlemen, appointed by the Nashville Industrial Exposition, has made a favorable report on his invention.

THE handsome palace-cars which ran over the North-Pennsylvania Railroad last summer, were placed on the road again last week. The elegant manner in which these cars are furnished renders them very inviting to the tourist, and we have no doubt they will meet with increased patronage the coming season.

RUSSELL & CO., of Massillon, O., manufacturers of railroad-cars and threshing-machines, used during 1871, pig-iron, 1891 tons; wrought-iron, 455 tons; and steel, 34 tons. They have recently commenced the manufacture of stationary and portable steam-engines. Are now operating two hundred men.

WILLIAM BUTCHER'S STEEL WORKS, LEWISTOWN, PA.—We invite attention to the advertisement of these works, which will be found on another page. The products of the establishment embrace tires, axles, crank-pins, and other articles of railway consumption. The leading feature of the works is, that new material only is used, with no admixture of scrap whatever, which secures greater uniformity in wear, and fewer defects. Mr. William Toothe, of this city, is the sales agent. His thorough familiarity with the manufacture of steel, and wide acquaintance with railroad men throughout the country, render him a valuable acquisition to the above-named establishment.

The Rubber Centre Spiral Group Spring.

NEXT to wheels and axles, there is no single feature of railway rolling stock of more vital importance than bearing springs. The economical operation of our roads, in their freight and passenger traffic, is affected by them more than many managers seem to suppose. A great deal of false economy is exhibited in the equipment of cars with springs of an inferior or second-rate quality, in order to avoid a comparatively trifling expense, when a few dollars more expended upon each vehicle would repay ten times over the additional cost, in longer service both of rolling stock and roadway.

Probably the best method yet discovered of combining steel and rubber for bearing purposes, is exhibited in what is called the *Rubber Centre Spiral Group Spring*, consisting of a cast-iron case or seat enclosing a number of small rubber centre spirals, which are kept in a position so that each acts with perfect freedom, and produce by their joint action the required result. By increasing or diminishing the size of the case, and the number of spirals, the resisting power of the combination can be adapted with the utmost precision to the service required.

These springs are manufactured exclusively by Vose, Dinsmore & Co., by virtue of letters-patent. Any other springs combining the two materials in a similar way, that may be offered in the market, are palpable infringements.

Crofutt's Trans-Continental Tourists' Guide.

It is the most Complete, Elaborate, and Comprehensive Guide Book ever Published in this or any other Country.

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Missouri River Bridge.
Dale Creek Bridge.
Hanging Rock.
Devil's Slide.
Finger Rock.
Eighteen Mule Team.
Wahsatch Hctel.
Starvation Camp.
Tunnel, Livermore Pass.
Constructing Show Sheds.
Rounding Cape Horn.
Seal Rocks, at Golden Gate.
First Construction Train.
Last Spike, Meeting of the East and West.
Yo Semite Falls.
Forest View.
Boating Party, Donner Lake.
Summit of Sierra Nevada Mountains.
Snow Sheds.
Truckee Bridge.
Bird's-Eye View of the Plains.
Palisades.
Great American Canyon.
Mormon Tabernacle.
Bloomer Cut.
Wash-a-kee, "Big Indian."

Sixteen Smaller Illustrations.

Buffalo Hunt.
Hydraulic Mining.
Sea Lions.
Brigham Young's Residence.
One Thousand Mile Tree.
Truckee River.
Gentile Sign.
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Colored Map of the World, showing route around the World with distance, time, and Fare.
Map of Omaha and Council Bluffs.
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Map of Route to Yo Semite Valley and Big Tree Groves.
Map of Salt Lake City.
Profile Grade Union Pacific R. R.
Profile Grade Central Pacific R. R.
Map of the Whole United States.
Map of Union and Central P. R. R.
Mining Map of Utah.
Map of the Globe.

Also a very large Illustration of the Proposed Great Union Pacific Railroad Depot at Omaha.

Cloth, Gilt Sides and Edges, $1.25; Paper $1.

VOL. IV. 1872.

Crofutt's Trans-Continental Tourists' Guide.

"It is to the traveler on the Pacific Road what the compass is to the mariner at sea."—*Odd Fellows' Excursion Party.*

ENLARGED, REVISED, RE-WRITTEN.

☞ If the volume for 1871 merited the following notice from the officials of the Union Pacific Railroad, what encomiums should the greatly improved book for 1872 elicit?

UNION PACIFIC RAILROAD,
General Passenger Department,
Omaha, Nebraska, Aug. 9, 1871.

GEO. A. CROFUTT, Esq.,
New-York.

Dear Sir:

You want our opinion of the new "CROFUTT'S TRANS-CONTINENTAL TOURISTS' GUIDE." We think you had a pretty substantial indorsement of its merits when the Union and Central Pacific Companies ordered thousands of copies for circulation in Great Britain and on the Continent, as an advertisement of our line. I have no hesitation in saying we give our unqualified approval of your book, as the first, most complete, and reliable work ever published to illustrate and describe the wonderful scenery, agricultural and grazing districts, mining resources, etc., of the vast country traversed by this route between the Missouri River and the Pacific coast. Its condensed form, numerous engravings, and correct maps, make it indispensable to the tourist, while its moderate price will put it within the reach of the general traveling public.

Yours truly,
THOS. L. KIMBALL,
General Passenger Agent.

I concur fully in the foregoing.
T. E. SICKELS, Superintendent.

New-York, Nov. 17, 1871.

From the "Father of the Electric Telegraph."

Dear Sir: I thank you for the copy you have sent me of CROFUTT'S TRANS-CONTINENTAL TOURISTS' GUIDE. From a cursory glance at its contents, I found it deeply interesting, and it can not fail to be indispensable to tourists who wish to explore the magnificent scenery, springs, mineral wonders, and other productions of the Great West.

Truly yours,
SAMUEL F. B. MORSE.

GEO. A. CROFUTT, Esq., New-York.

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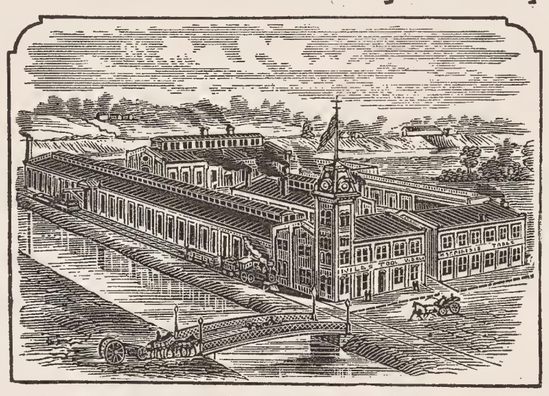

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Car Axle Lathes, (Gray's Patent,)
Car Wheel Borers,
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Brilliant Railroad Car Lamp, WITHOUT KEROSENE.

New Law of Massachusetts
ABOUT LIGHTING PASSENGER CARS.

A Law has passed the Massachusetts Legislature (May 29, 1872) prohibiting the use of oil below 300° fire test, instead of 110° as heretofore. The

Mineral Sperm Oil

meets the requirements of this law. It is now used by **all the Roads leading from Boston,** and by many other Roads, and by a large number of **Pullman's Palace Cars,** in the place of kerosene or candles.

THE LIGHT IS EQUAL TO KEROSENE

and the expense not half that of candles.

To use this oil in our common car lamps, now in use in all parts of the country, it is only necessary to **Change the Burner,** (costing about 50 cents per lamp.) For new lamps, in place of candles, send for lithograph and price-list. This oil is 55 cents per gallon in Boston, New-York, Pennsylvania, etc.

WILLIAMS, PAGE & CO., Boston, Mass.,
Manufacturers of Car Lamps and Car Candle-Lamps, and dealers in Mineral Sperm-Oil and Car Candles.

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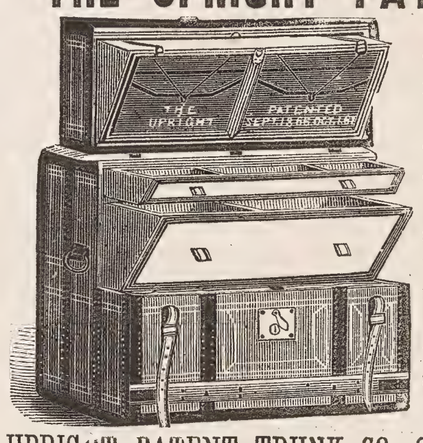

Opens without removing from the wall.

Instead of trays to lift out, it is arranged with drawers.

It is STRONGER, as only a small portion opens, whereas in the old style the whole top comes off.

Same room in bottom of the trunk for dresses as in the old style.

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Central of New-Jersey	*T. W. Peeples	George Hackett	Elizabethport, N. J.
Central Branch Union Pacific	Wm. D. Rowley		Atchison, Kansas.
Central R. R. of Iowa	O. R. Ford	O. R. Ford	Marshall, Iowa
Central Pacific	A. J. Stevens	Benjamin Welch	Sacramento, Cal.

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Delaware & Hudson Canal Co	James Dickson	Thomas Orchard	Carbondale, Pa.
Rensselaer & Saratoga Div	W. B. Gage		Troy, N. Y.
Dorchester & Delaware			Cambridge, Md.
Dubuque South western			Dubuque, Iowa.
Dutchess & Columbia	W. G. Vanbuskirk	H. A. Webster	Fishkill, N. Y.
Dunkirk, Warren & Pittsburg	Joseph Haggart	Joseph Haggart	Dunkirk, N. Y.

E

Eastern		J. P. Somerby	Salem, Mass.
Eastern	John Thompson		East-Boston, Mass.
East-Tennessee & Virginia	Eli Hixon	Jos. Armbruster	Knoxville, Tenn.
East-Tennessee & Georgia	Eli Hixon		Knoxville, Tenn.
East Pennsylvania	J. M. Geary	Samuel Reeves	Reading, Pa.
Elizabethtown and Paducah		T. A. Cordrey	Elizabethtown, Ky.
Erie Railway	*E. O. Hill		Susquehanna, N. Y.
Erie Railway	James B. Gregg		
Erie Railway	H. L. Brown	C. A. Smith	Jersey City, N. J.
Erie Railway	M. E. Brown	M. Wilder	Buffalo, N. Y.
Erie Railway	W. E. Cooper	W. E. Cooper	Hornellsville, N. Y.
Erie Railway		W. E. Rutter	Elmira, N. Y
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European & North Am. (of Maine)	A. O. Bailey	J. H. Brown	Oldtown, Maine.
Erie & Pittsburg	John Young	John Young	Erie, Pa.
Evansville, Terre Haute, & Chicago			Terre Haute, Ind.

F

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Florida	A. W. Taylor	G. Hernandez	Fernandina, Fla.
Flint & Pere Marquette	Sanford Keeler	Sanford Keeler	East-Saginaw, Mich.
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Fitchburg & Worcester	John Webster	Samuel Stevens	Fitchburg, Mass.

G

Grand Trunk	†Richard Eaton	J. W. W. McWood.	Montreal, Canada.
Grand Trunk		Howard Fry	Sherbrooke, Can.
Grand Trunk		B. J. Mitchell	Portland, Me.
Galveston, Houston & Henderson	Wm. Macbeth	Wm. Macbeth	Galveston, Texas.
Grand Rapids & Indiana			Fort Wayne, Ind.
Great Western of Canada	†Wm. A. Robinson	F. Childs	Hamilton, Canada.
Georgia	William Hardman	T. M. Preval	Augusta, Ga.
Greenville & Columbia	J. T. Price	J. T. Price	Helena, S. C.

H

Harlem Extension	George W. Blanchard		Rutland, Vt.
Harlem Extension		C. S. Clapp	Bennington, Vt.
Hanover Branch	John J. Bingley	Henry Britcher	Hanover, Pa.
Hartford & New-Haven	John O. Chapman	F. Leppense	Hartford, Ct.
Hannibal & St. Joseph	H. A. Towne	H. C. Whiting	Hannibal, Mo.
Hartford, Providence & Fishkill	Edwin Garfield	V. D. Perry	Hartford, Ct
Hackensack & New-York	Abra'm Angausen		Hackensack. N. J.
Housatonic	C. R. Morris	J Ferris	Bridgeport, Ct.
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Houghton & Ontonagon			L'Anse, Mich.
Houston Tap & Brazoria	T. J. Shellhorn	T. J. Shellhorn	Houston, Texas.
Huntington & Broad-Top Mountain	D. G Gilchrist	M. Tellerhoof	Saxton, Pa.
Hempfield	T. Marsh		Wheeling, Va.
Houston & Great Northern	T. J. Shellhorn	T. J. Shellhorn	Houston, Texas.

I

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Indianapolis, Peru & Chicago	John McKenna	John McKenna	Peru, Ind.
Illinois Central	†S. J. Hayes	H. O. Wadlie	Chicago, Ill.
Chicago Division	George Holton		Chicago, Ill.
South Division	David Oxley		Centralia, Ill.
North Division	J. B. Edams		Amboy, Ill
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Iowa & Missouri State Line			Farmington, Iowa
Iron	Perry Scott	Clem. Roetling	Ironton, Ohio.
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Indianapolis, Bloomington & Western	Tho. V. Losee	Tho. V. Losee	Urbana, Ill.
Ionia & Lansing	H. Loughlin		Lansing, Mich.

J

Jeffersonville, Madison & Indiana	Reuben Wells	John Higgins	Jeffersonville, Ind.

K

Knox & Lincoln			Bath, Maine.
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Knoxville & Charleston			Knoxville, Tenn.
Kansas Pacific	L. H. Waugh		Wyandotte, Kansas.
Kalamazoo, Allegan & Grand Rapids			Kalamazoo, Mich.
Kansas City, St. Joseph & Council Bluff	H. L. Cooper	H. L. Cooper	St. Joseph, Mo.

L

Lake Erie & Louisville	John Pero		Fremont, Ohio.
Lake Superior & Mississippi	W. McFarland	A Coburn	St. Paul, Minn.
Lackawanna & Bloomsburg	Chas. Graham		Kingston, Pa.
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Lehigh Valley	P. Hofecker	E. R. Brown	Weatherly, Pa.
Lehigh Valley	A. Mitchell	Mauch Chunk, Pa.	Delano, Pa.
Lehigh Valley	D. Clark		Hazelton, Pa.
Lehigh & Susquehanna	L. C. Brastow	L. C. Brastow	Wilkesbarre, Pa.
Lehigh & Susquehanna	Wm. H. Brown		Mauch Chunk, Pa.
Leavenworth, Lawrence & Gal	S. M. Philbrick		Lawrence, Kansas.
Little Rock & Fort Smith	A. Klohs		Little Rock, Ark.
Little Miami	J. H. Setchel		Cincinnati, Ohio.
London & Port Stanley			London, C. W.
Louisville, New-Albany & Chicago	Jacob Losey	Jacob Losey	New-Albany, Ind.
Long Island	Chs. A. Thompson.	B. T. Little	Hunter's Point, L. I.
Louisville, Cincinnati & Lexington	John Skidmore	S. S. Pilson	Louisville, Ky.
Louisville & Nashville	Thatcher Perkins	Thatcher Perkins	Louisville, Ky.
Clarksville Division	Jas. Montgomery		Bowling Green, Ky.
Lake Shore & Michigan Southern	*James Sedgley	‡John Kirby	Cleveland, Ohio.
Michigan Southern Division	William Hill		Elkhart, Ind.
" " "		S. S. Knapp	Adrian, Mich.
Toledo Division	Geo. H. Tier	Frank O. Bray	Norwalk, Ohio.
Erie Division	L. O. Gassett	J. Withyecombe.	Cleveland Ohio.
Buffalo Division	B. H. Kidder	A. Robson	Buffalo, N. Y.

M

Marquette & Ontonagon	A. P. Burroughs	H. D. Lyons	Marquette, Mich.
Macon & Augusta			Macon, Ga.
Maine Central	J. W. Philbrick	J. W. Philbrick	Waterville, Me.
Macon & Western	D. M. Gogul	James A. Knight	Macon, Ga
Manchester & Lawrence	Edward Studley	M. W. Dickerman.	Concord, N. H.
Macon & Brunswick	M. Thornton	M. Thornton	Macon, Ga.
Maysville & Lexington			Maysviille, Ky.
Marietta & Cincinnati	E. Bosley	E. Bosley	Chillicothe, Ohio.
Memphis & Little Rock	N. Greener	C. W. Wooldridge	Huntsville, Ark.
Memphis & Charleston	Michael Burk	A. W. Drew	Memphis, Tenn.
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‡ General Master Car-Builder.

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Missouri, Kansas & Texas	C. T. McIlvaney	J. Townsend	Sedalia, Mo.

N

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Northern Central		G. W. Demarest	York, Pa.
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North-Pennsylvania	Franklin Roop	Franklin Roop	Philadelphia, Pa.
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Northern	James W. Lander	Albert Langmaid	Concord, N. H.
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Northern Pacific	†Geo. W. Cushing		St. Paul, Minn.

O

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Old Colony & Newport	J. K. Taylor	A. Gleason	Boston. Mass.
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Oil City & Pithole	George Thompson		Pithole, Pa.
Oil Creek & Alleghany River	J. S. McElroy	Jacob Williams	Corry, Pa.
Oil Creek & Alleghany	H.J.Bookhammer.	John Monks	Oil City, Pa.
Ohio & Mississippi	*F. J. Roth	M. Contant	Cochran, Ind.
East Division	A. Thompson		Cochran, Ind.
West Division	H. Elliott		East St. Louis, Ill.

P

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Pacific of Missouri	E. B. Gibbs	E. B. Gibbs	St Louis, Mo.
Pennsylvania	†G. C. Gardner		Altoona, Pa.
Pennsylvania	H. D. Garrett	I. W. Van Houten	W. Philadelphia, Pa.
Pennsylvania	E. L. Caum	Samuel W. Myers	Harrisburg, Pa.
Pennsylvania	G. W. Strattan	John P. Levan	Altoona, Pa.
Pennsylvania	D. O. Shaver	R. S. Ramsey	Pittsburg, Pa.
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	W. L. Foster	Robt.M.Messimer.	Renovo, Pa.
	W. L. Holman	Wm.P. Newcomb.	Kane, Pa.
	W. T. Smith.	David Cowley	Erie, Pa.
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Philadelphia & Reading	L. B. Paxson	Aaron Steinbach	Reading, Pa.
Philadelphia, Germ'n & Norris'n	John Moyer	Nathan Pawling	Philadelphia, Pa.
Philadelphia & Baltimore Central	S. D. Danfield	SamuelD.Danfield.	Chester, Pa.
Pittsburg, Cincinnati & St. Louis	James Ball	James Ball	Logansport, Ind.
	Robert Curtis	Theo. Chamberlain	Columbus, Ohio.
	E. Pierce		Dennison, Ohio.
	Thomas V. Losee	John Gottschall	Indianapolis, Ind.
		James McGee	Steubenville, Ohio.
Little Miami Division	J. H. Setchell		Cincinnati, Ohio.
Little Miami Division		M. P. Ford	Columbus, Ohio.
Peoria & Rock Island	Theo. Mosher		Peoria, Ill.
Pittsburg, Fort Wayne & Chicago	S. M. Cummings	John Marquis	Alleghany, Pa.
Pittsburg, Fort Wayne & Chicago	J. M. Boon		Fort Wayne, Ind.
Pittsburg, Fort Wayne & Chicago		J. J. Kirkland	Crestline, Ohio.
Pittsburg & Connellsville	D. P. Rennie	J. M. Rutter	Connellsville, Pa.
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Portland & Kennebec	John Ellis	J. W. Trussel	Augusta, Me.
Portland & Oxford Central	Geo. W. Battles	Geo. W. Battles	Buckfield, Me.
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Port Royal			Beaufort. S. C.
Port Hope, Lindsay & Beaverton	H. G. Taylor	H. G. Taylor	Port Hope, Can.
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Providence & Worcester	Joseph Kelly	Olney L. Smith	Providence, R. I.
Poughkeepsie & Eastern	John L. Driscoll	John L. Driseoll	Poughkeepsie, N. Y.

R

Raleigh & Gaston	J. B. Gayle	J. B. Gayle	Raleigh, N. C.
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Richmond Danville & Piedmont	John McFarland	H. Longest	Richmond, Va.
Richmond & Petersburg	John O'Brien	J. J. Martin	Richmond, Va.
Richmond & York River	C. H. Harris	J. L. Thompson	Richmond, Va.
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Reading & Columbia	B. Van Lew		Columbia, Pa.
Rome, Georgia	O. W. Harbin	O. W. Harbin	Rome, Ga.
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Rockford, Rock Island & St. Louis	R. D. Grant		Beardstown, Ill.
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S

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Southern Minnesota	Wm. Lininger		Wells, Minn.
Southern of Canada	Albert Congdon	Albert Congdon	Fort Erie.
South-Western of Georgia	C. D. Wall		Columbus, Ga.
South-Western of Georgia	D. M.Gogul	James A. Knight	Macon, Ga.
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Stonington & Providence	J. H. Anderson	J. H. Anderson	Providence, R. I.
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Selma, Rome & Dalton	A. G. Maynes	W. W. Peirce	Selma, Ala.
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Spartanburg & Union	J. N. Benner	Jacob Rice	Union C. H., S. C.
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Sullivan & Erie			Tonawanda, Pa.
Syracuse & Binghamton, N. Y.	B. G. Merrill	B. G. Merrill	Syracuse, N. Y
Sycamore & Cortland			Sycamore, Ill.
St. Louis & South-Eastern	C. B. Salisbury		Mt. Vernon, Ill.
St. Louis, Kansas City & Northern	John Calhoun	C. S. Buck	St. Louis, Mo.

T

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Troy & Boston	Foster Church	R. V. Coon	Troy, N. Y.
Toronto, Grey & Bruce			Toronto, Can.

U

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V

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Vineland			Vineland, N. J.
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W

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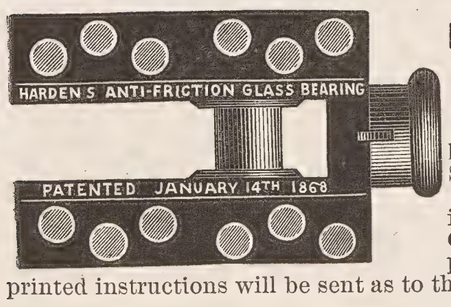

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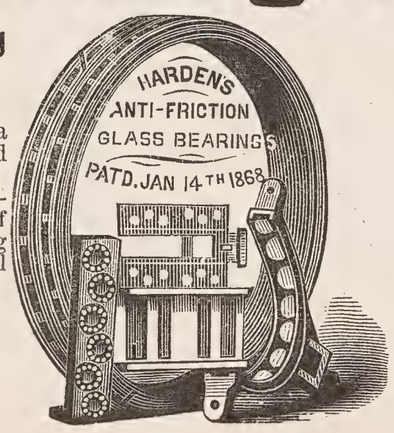

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Fremont Car Co	Fremont, Ohio.
Gardner, F. & Co.	Carlisle, Pa.
Gill, John L	Columbus, Ohio.
Gilbert, Bush & Co	Troy, N. Y.
Goold, James & Co	Albany, N. Y.
Goodrich Car Co	Augusta, Ga.
Haskell & Barker	Michigan City, Ind.
Harrisburg Car Manufacturing Co	Harrisburg, Pa.
Heathcote, Herbst & Co	Glen Rock, Pa.
Hamilton, William & Son	Toronto.
Harlan & Hollingsworth Co	Wilmington, Del.
Highspire Cooperative Car Co	Highspire, Pa.
Indiana Car Co	Cambridge City, Ind.
Jackson & Sharp Co	Wilmington, Del.
Jackson & Woodin	Berwick, Pa.
Jones, J. M. & Co	West-Troy, N. Y.
Kimball Manufacturing Co	San Francisco, Cal.
Keith, H. T. & I. N	W. Sandwich, Mass.
Laporte Car Manufacturing Co	Laporte, Ind.
Lombard, Thomas	Augusta, Me.
Lebanon Manufacturing Co	Lebanon, Pa.
Louisville Car-Wheel & Railway Supply Co	Louisville, Ky.
Lehigh Car Manufacturing Co	Stemton, Pa.
Stephenson, John & Co	New-York, N. Y.
Michigan Car Co	Detroit, Mich.
McNairy, Claflen & Co	Cleveland, Ohio.
Murray, Dougall & Co	Milton, Pa.
McVay, Walker & Co	Braddock's Field, Pa.
Mowry Car and Wheel Works	Cincinnati, O.
Middletown Car & Manufacturing Co	Middletown, Pa.
Missouri Car and Foundry Co	St. Louis, Mo.
New-Haven Car Co	New-Haven, Ct.
Niblo, James M	Conshohocken, Pa.
Ohio Falls Car Co	Jeffersonville, Ind.
Ontario Car Co	London, Ont.
Peabody & McDonald	Calais, Me.
Peters, Simon	Quebec.
Pittsburg and McKeesport Car Co	McKeesport, Pa.
Pittsburg Car and Locomotive Co	Pittsburg, Pa.
Portland Co	Portland, Me.
Pullman Car Co	Chicago.
Peregoy, J. H	Houston, Texas.
Quealy, W. J	Hannibal, Mo.
Ranlet Car Manufacturing Co	Laconia, N. H.
Russell & Co	Massillon, Ohio.
Sands, William L	Pottstown, Pa.
Schall, Michael	York, Pa.
Shaaber & Johnston	Reading, Pa.
Southern Car-Works	Independence, La.
South-Western Car Co	Jeffersonville, Ind.
Shoenberger & Bryant	Duluth, Minn.
Seath & Hager	Terre Haute, Ind.
Taunton Car Co	Taunton, Mass
Tredegar Co	Richmond, Va.
Tiffin Car-Works	Tiffin, Ohio.
Vigo Foundry and Terre Haute Car-Works	Terre Haute, Ind.
Wharton, Thomas J	Brunswick, Ga.
Whittaker, Phillips & Co	Toledo, Ohio.
Wason Manufacturing Co	Springfield, Mass.
Weimer, P L & Bros	Lebanon, Pa.
Wyoming Valley Manufacturing Co	Wilkesbarre, Pa.
Wells, French & Co	Chicago, Ill.

Car-Wheel Manufacturers.

Albany Car-Wheel Works	Albany, N. Y.
Atlantic Iron-Works	Portsmouth, Va.
Baltimore Car-Wheel Foundry Co	Baltimore, Md.
Barnum & Richardson Manufacturing Co	Chicago, Ill.
Barney & Smith Manufacturing Co.	Dayton, Ohio.
Bass & Hanna	Fort Wayne, Ind.
Bailey, Howson & Co	St. Paul, Minn.
Boston Car-Wheel Co	Camb'gep't, Mass.
Davenport, Fairbairn & Co	Erie, Pa.
Dawson Manufacturing Co	Dawson, Ga.
Detroit Car-Wheel Works	Detroit, Mich.
Fulton Foundry Co	Cleveland, Ohio.
Gill & Bidwell	Allegheny City, Pa.
Green, D. P. & Co	St. Louis, Mo.
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John L. Gill	Columbus, Ohio.
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Missouri Car and Foundry Co	St. Louis, Mo.
Moore Elastic Car-Wheel Co	Jersey City, N. J.
Mowry Car and Wheel Works	Cincinnati. Ohio.
Ohio Falls Car Co	Jeffersonville, Ind.
Pettengill, Glass & Co	Cleveland, Ohio.
Quealey, W. J	Hannibal, Mo.
Ramapo Wheel & Foundry Co	Ramapo, N. Y.
Scoville, J. & N. C	Buffalo, N. Y.
St. Louis Car-Wheel Co	St. Louis, Mo.
Taylor Iron Works	High Bridge, N. J.
Thompson, Douglas	Bordentown, N. J.
Tredegar Company	Richmond, Va.
Toronto Car-Wheel Co	Toronto, Can.
Washburn, Hunts & Co	Jersey City, N. J.
Washburn Car-Wheel Manufacturing Co	Worcester, Mass.
Wason Manufacturing Co	Springfield, Mass.
Whitney A. & Sons	Philadelphia, Pa.
Woodbury & Company	E. Cambr'ge, Mass.
Wyoming Valley Manufacturing Co	Wilkesbarre, Pa.

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Brooks Locomotive Works	Dunkirk, N. Y.
Danforth & Cooke	Paterson, N. J.
Dawson & Baily (light locomotives)	Pittsburg, Pa.
Dickson Manufacturing Co	Scranton, Pa.
Grant Locomotive Works	Paterson, N. J.
Hinckley & Williams	Boston, Mass.
Manchester Locomotive Works	Manchester, N. H.
Mason, William	Taunton, Mass.
McKay Iron and Locomotive Works	Jersey City, N. J.
Portland Company	Portland, Me.
Porter, Bell & Co. (light locomotives)	Pittsburgh, Pa.
Pittsburg Locomotive Works	Pittsburg, Pa.
Rogers Locomotive Works	Paterson, N. J.
Rhode Island Locomotive Works	Providence R. I.
Schenectady Locomotive Works	Schenectady, N. Y.
Taunton Locomotive Works	Taunton, Mass.

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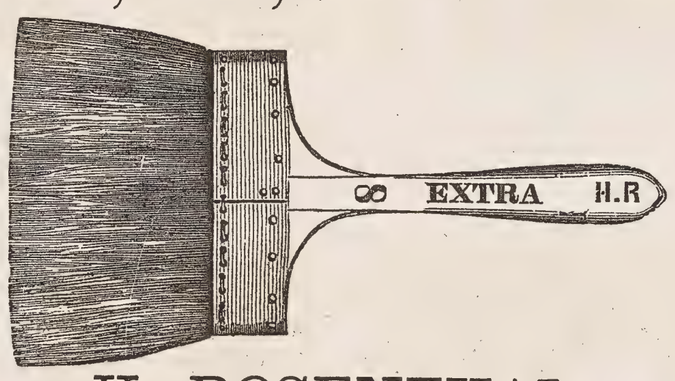

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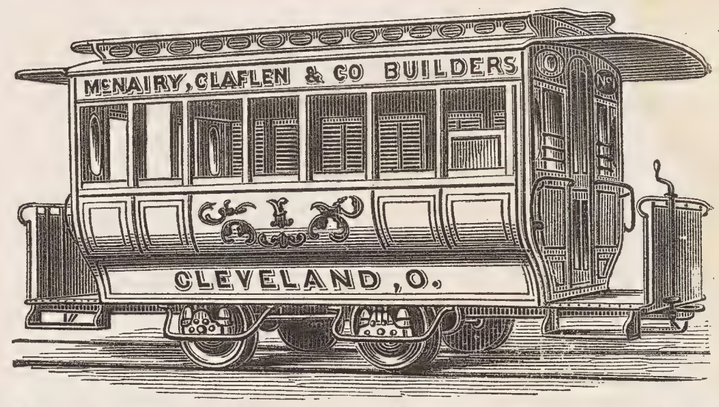

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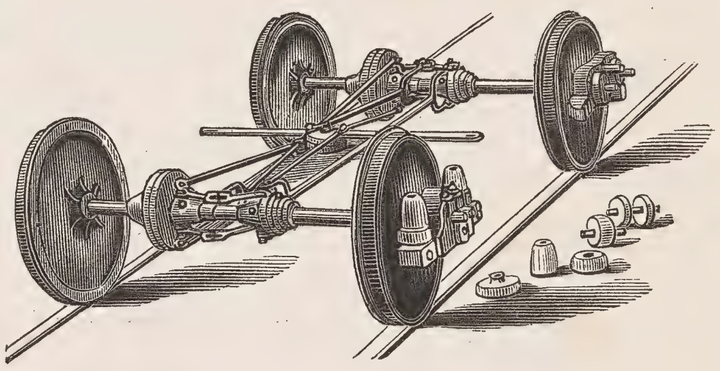

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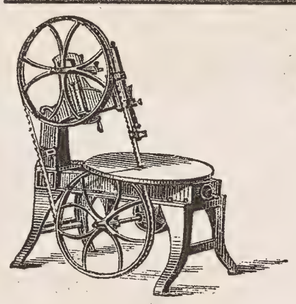

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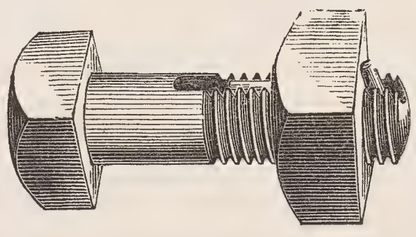
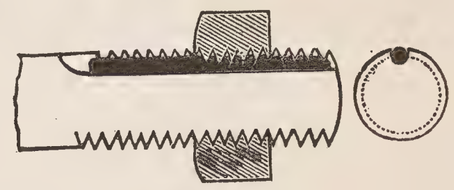
Manufacturers of all kinds of BOLTS, for FISH-PLATES, CARS, BRIDGES, MACHINERY, CARRIAGES, &c., with the



"CUMMING NUT-LOCK,"
Patented
June 16, 1868,
August 23, 1870.



SECTIONS.

Unequaled for CHEAPNESS, SIMPLICITY & EFFECTIVENESS.

This simple device, as will be seen by the engravings, consists of a groove being cut in the threaded part of a screw bolt into which is placed a key of copper wire, or other soft metal; when the nut is screwed on, it cuts a thread on the key, thereby making it impossible for the key to get out until the nut is taken off. When the nut is screwed up to its place, that part of the key over which the nut has passed is riveted up against the nut with a small punch, destroying the thread on the key. The nut, therefore, can not move backward until force is used, as with a wrench.

The groove can be rapidly cut with a simple machine designed for the purpose.

Experience has proved this device absolutely reliable, and it is the cheapest of all known devices for the purpose. By its use, old bolts on which the nuts have become too slack for use can be made as good as new, making it a great saving to railroad companies and others in that item alone. It is cheaper than a check-nut.

If the bolt should become slack from shrinking of timber or other causes, *the nut will always remain firmly attached to the bolt*, and, with the wrench, can be screwed up *any distance*, and the wire riveted up any number of times, or can be taken off without injury to the nut or bolt.

This is the only method in use that locks the nut firmly to the bolt without regard to place or surroundings, all others require some attachment that holds the bolt in its position, and a washer or other attachment to keep the nut from turning.

DIRECTIONS FOR USE.—Place the copper key in the slot, pointed end out, and beveled side up, in such a position that when the nut is screwed to its place about three-eighths of an inch of the key will project beyond its outer face. Then screw the nut to its place *over the key*, allowing it to cut its own thread in the copper. Then take a narrow flat set punch, and rivet the projecting part of the key *solidly* against the outer face of the nut. To tighten the nut: screw it up, and rivet the key tighter. To remove the nut: simply apply the wrench and unscrew the nut. It will cut its own way out through the copper. The same key can be used several times, by moving it outward a few threads in the slot.

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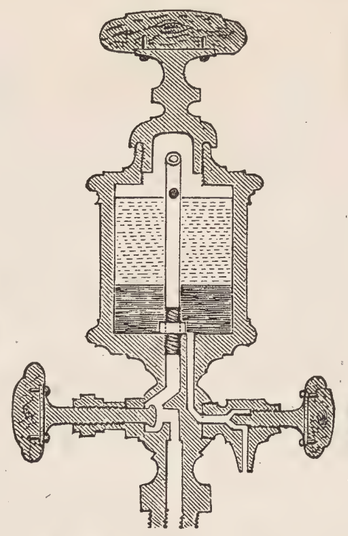

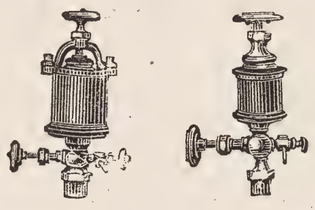

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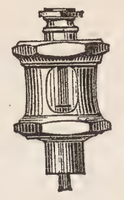
These Oil Cups have a wide renown for their reliability and economy, which makes them the favorite with every Engineer and Mechanic who has them in use. They are made in different styles and sizes, but all work on the great principle of a free and perfectly automatic action on the bearing, and only when the machinery is in motion.

We call particular attention to our

SELF-ACTING LUBRICATORS FOR CYLINDERS.



Their advantages over other lubricators are so striking that it is only a question of time for them to come in general use, their accuracy in keeping the valves and pistons thoroughly and constantly lubricated being unequaled.

The principle of working is based on an intermittent condensation of steam in the *upper part* of the cup containing the lubricant. At every couple of strokes the steam, condensing, produces a drop of water, which, being heavier then the oil, sinks by its own gravity and raises a corresponding drop of oil over into a tube, which arises in the centre of the cup and conveys said oil directly to the chest and cylinder, this tube being the only connection from the lubricator to the internal part of the engine. The water produced by the condensation is drawn off once a day by a side-cock, and the cup filled again with the lubricant. Another advantage is, that the condensing process refines the oil, as the water settling down through the lubricant carries down salts and acids which may be contained therein. In this way corrosion of the steam-chest and cylinder is prevented, the power of the engine improved, and an amount of packing saved.

These lubricators have been adopted on ***thousands*** of stationary and marine engines, steam-pumps, steam fire-engines, and on locomotives by over ***eighty railroads*** in the United States.

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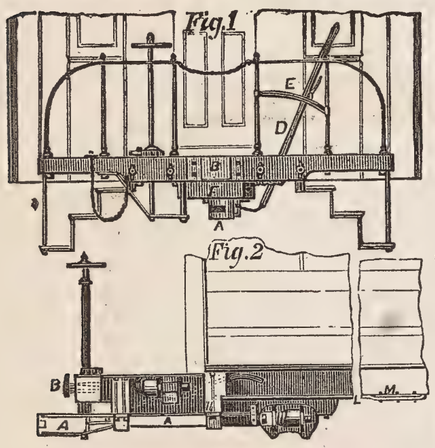

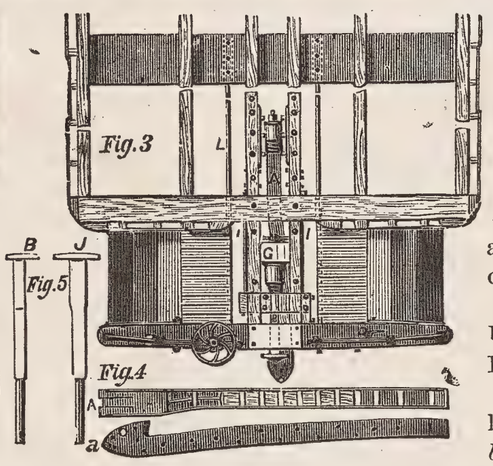

Office, 231 Broadway, (Rooms 4 and 5,) New-York.

Send for Illustrated Pamphlet, and call and see working models. **E. MILLER, Patentee.**

DESCRIPTION.

Figure 1 is an elevation; Figure 2, a longitudinal section; Figure 3, a plan of an end of a car to which the arrangement has been applied: and Figures 4 and 5 show top and side views of the "Hook" and "Buffer," drawn on a larger scale than that of Figures 1, 2, and 3.

The letters refer to the same parts in all the figures. A is the coupling "Hook," B the "Buffer," C the "Stop," D the "Lever," E the "Quadrant Ratchet," F the "Truss Beam," G the "Spring Beam," H the "Suspender Beam," I the "Upward Trusses," K the "Main Spring," L the "Downward Trusses," and M the "Bolster."

The Platforms, instead of being located below the centre line of the main sills of the cars, are placed *in* that line, and held there by the Trusses I and L, so that the point of contact (in Buffers B) is *in* the said centre line and *not below* it.

The coupling "Hook" A is attached to the draw spring the same as the ordinary draw head, and at the same height above the track, but in such a manner that the outer end is free to move laterally for a short distance. The Coupling Hook projects beyond the platform. The Stop C is placed under the Buffer Beam to prevent accidental uncoupling. When two cars are brought together, the Coupling Hooks, from *their shape*, push each other aside, until the Buffers B are compressed hard on the Buffer Springs, then—*the points of the hooks having passed each other sufficiently far*—the Hooks are carried forward by their main-springs, and thus the "*Coupling*" and "*Compression*" are both effected automatically *and at the same time*, and without the use of links and pins. When two cars are thus coupled together, the *head* of the *Hook* of each car is under the Buffer Beam of its opposite car, and the platforms are close together, (about 4 inches apart.) The effect of this is, *one platform can not be forced over the other*, nor can a *child* fall between the platforms; the dust and rain are nearly all shut out; the "Compression" makes the train run steadily, and prevents all jerking at starting and stopping.

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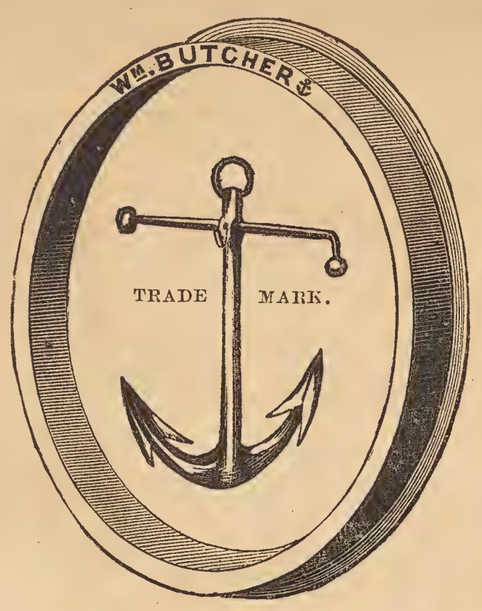

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Pure Raw and Boiled Linseed Oil, White Leads and Zincs, Colors, Putty, Varnishes, Japans, etc.

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Samples of all the Colors, with Price-List, will be furnished on application.

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To our variety of styles of ornaments, made to match black walnut in color, and which are perfectly fitted for use where not exposed to the weather. They have been sold extensively for the past two years, and have given entire satisfaction—so that all who have once used them have become constant consumers. They are artistic in design and unequaled in execution, being the production of the best artists, carvers, die sinkers, and moulders.

These ornaments hold glue and screws as well as carvings. They do not warp or crack. They are unaffected by changes of temperature, and withstand dampness as well as furniture. They will polish in every respect equal to wood, either with shellac, oil, wax, or varnish, and with less trouble, as there is no open grain to fill. They will gild or bronze beautifully by simply sizing, without any other preparation.

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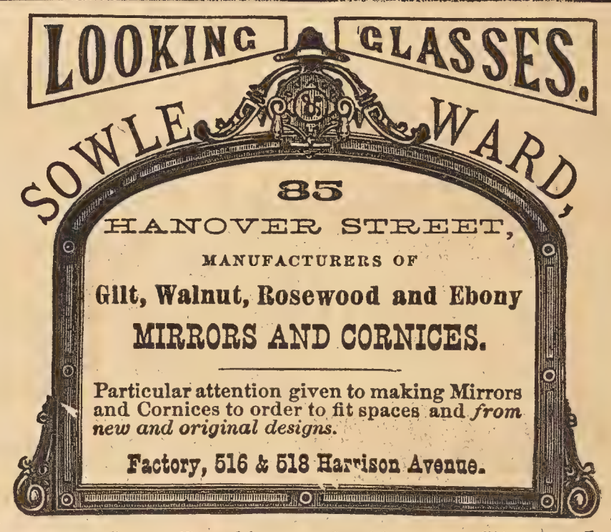
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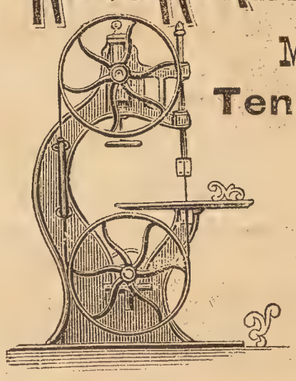

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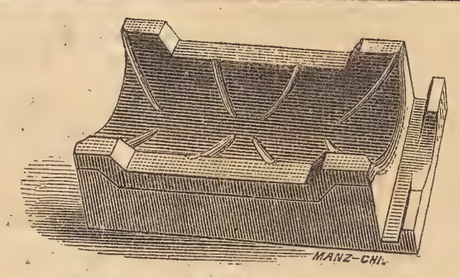

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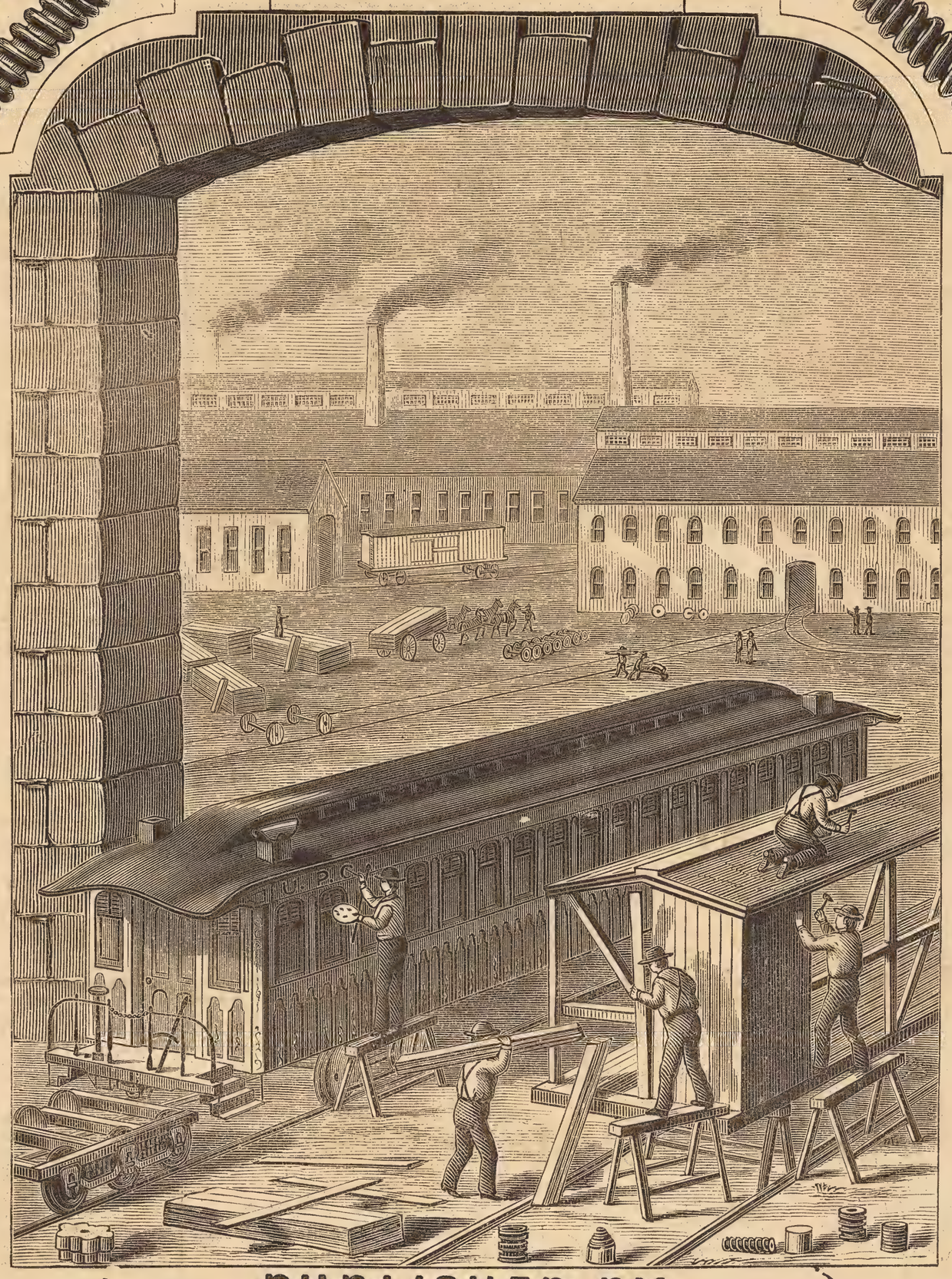

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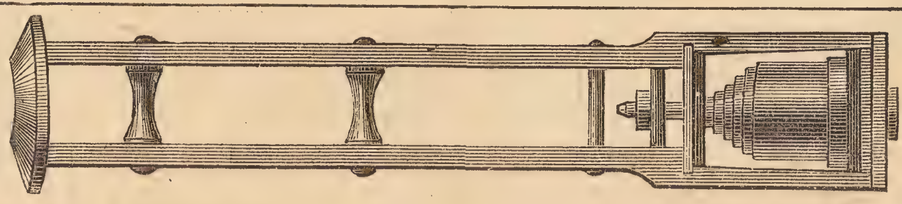

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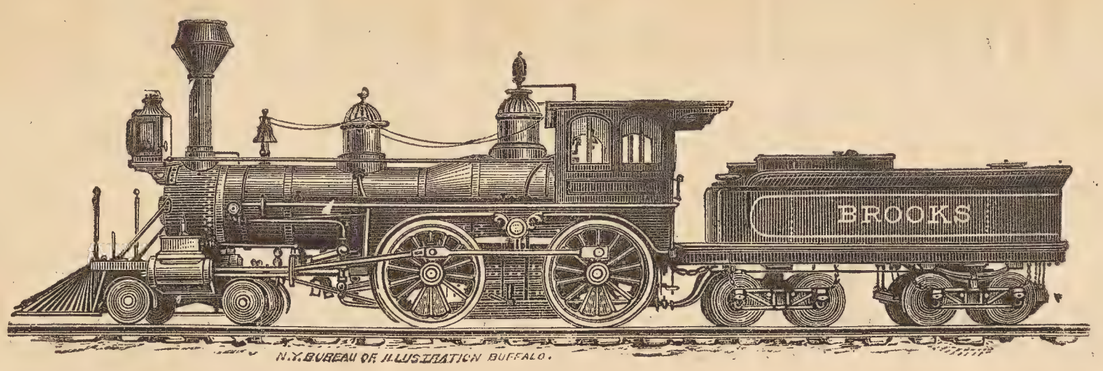

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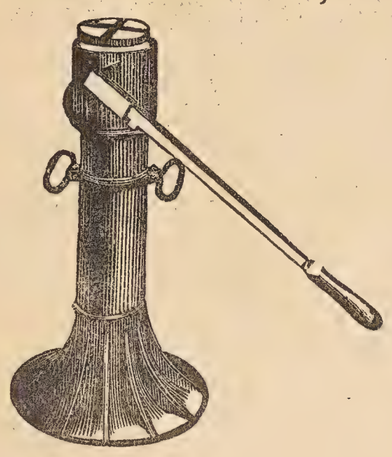

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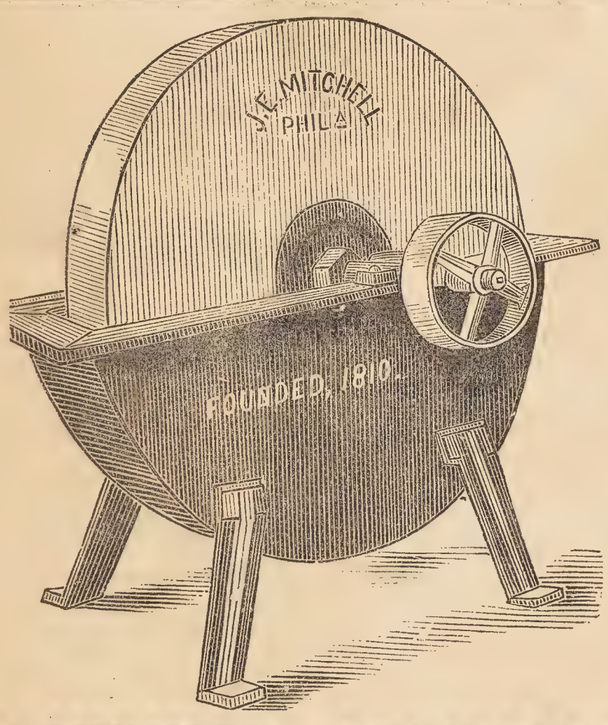

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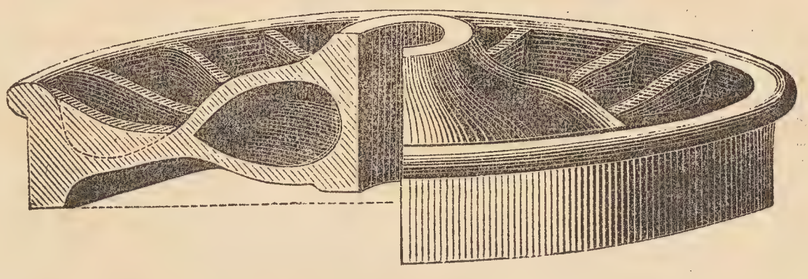

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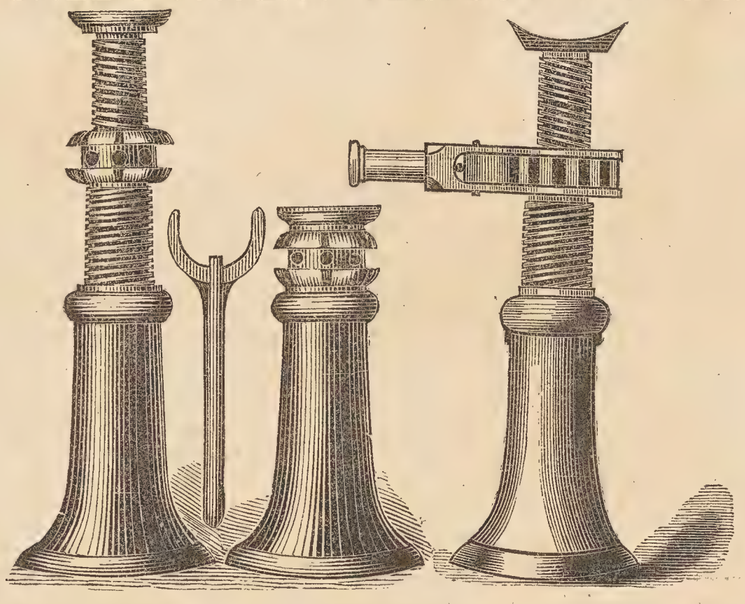

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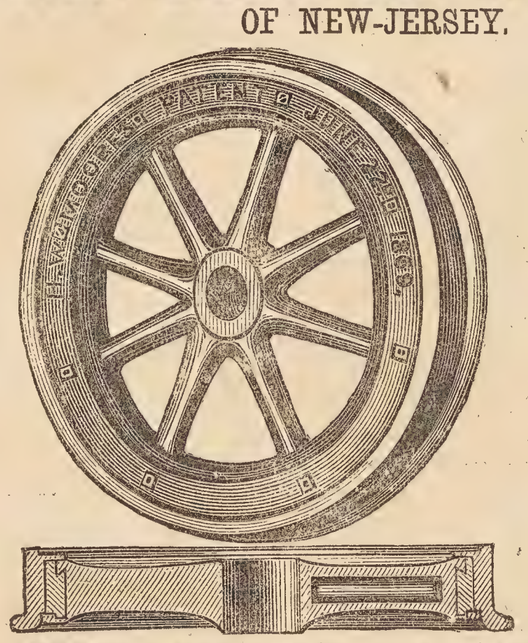

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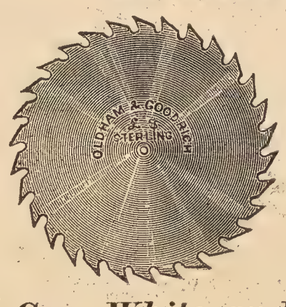

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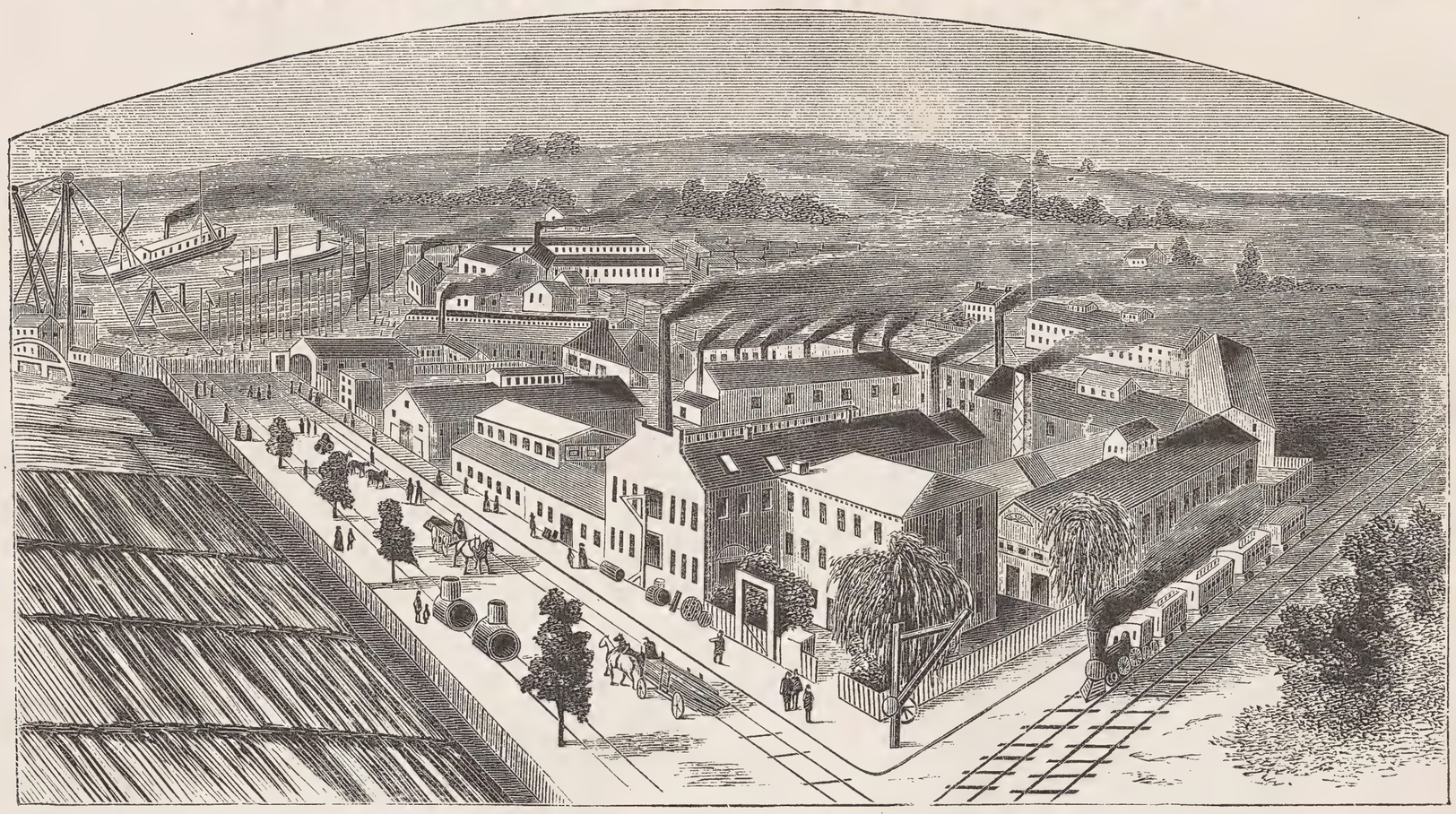

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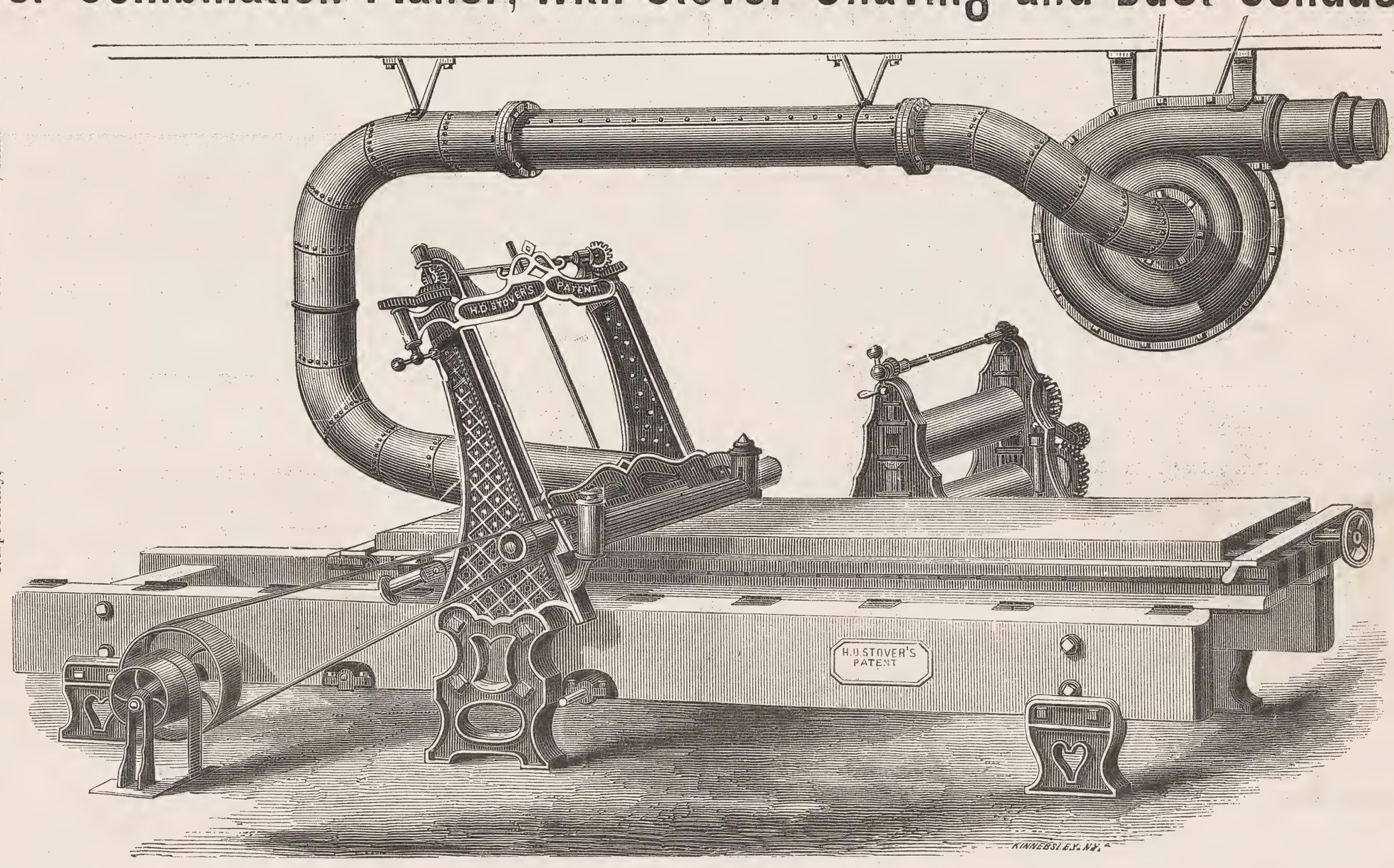

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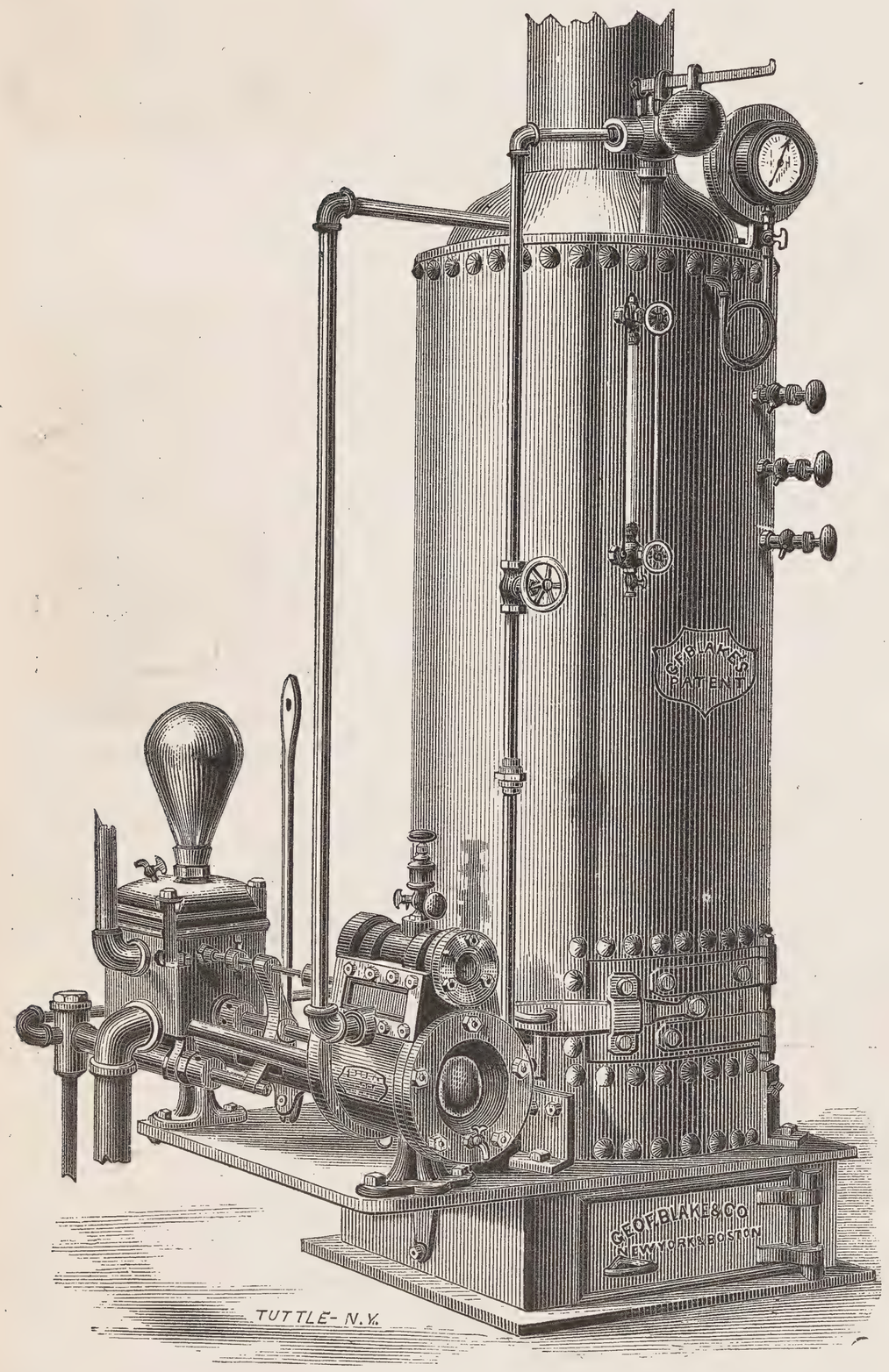

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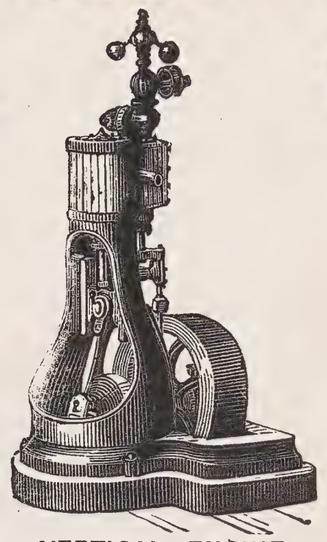

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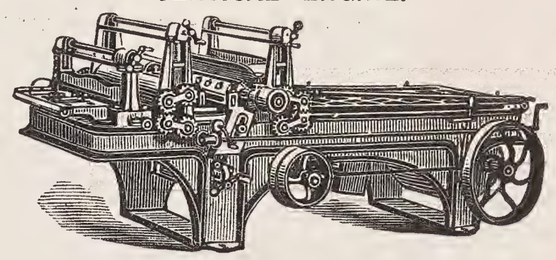
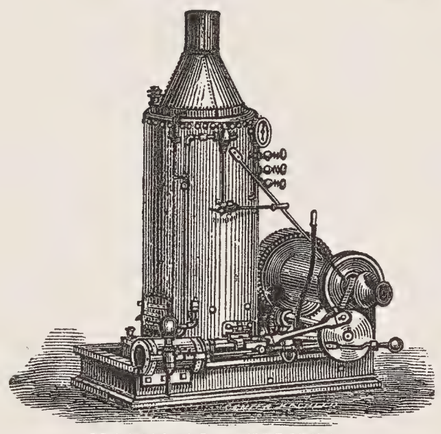
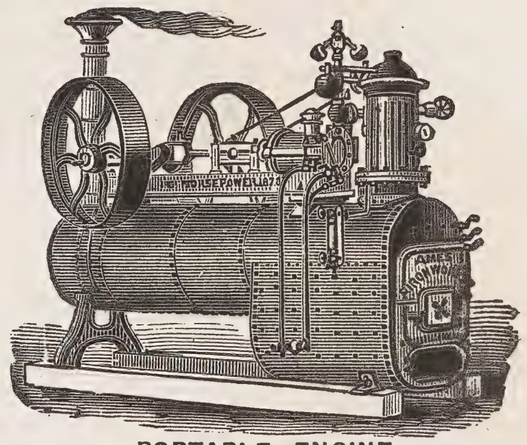


WOODWORTH PLANER.



HOISTING ENGINE.



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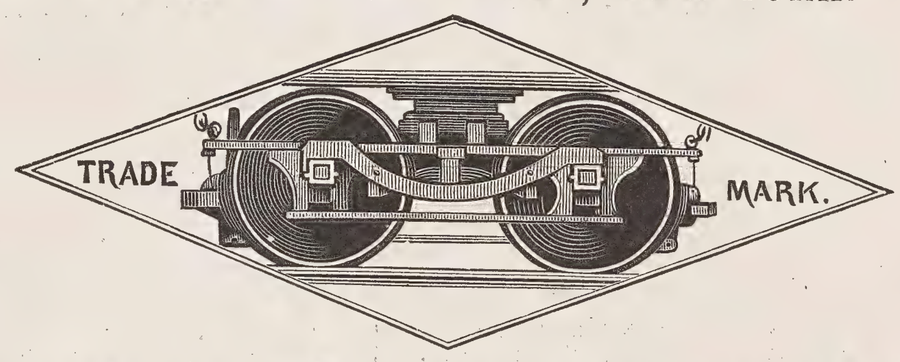

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The Packing dispenses with the use of Oil and Waste, and prevents all heating of journals, requires less time and attention than any other now manufactured, and causes a saving of at least twenty-five per cent.

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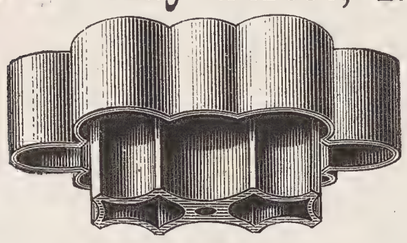

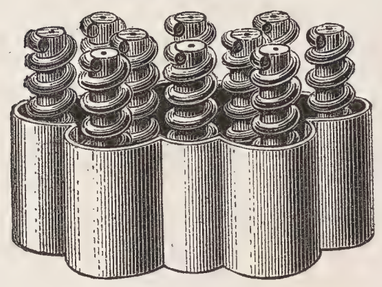

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Our *Volute Spring* is too well-known as a buffer to require comment. They are made either plain, concave, or corrugated, have a perfect temper, and are without friction.

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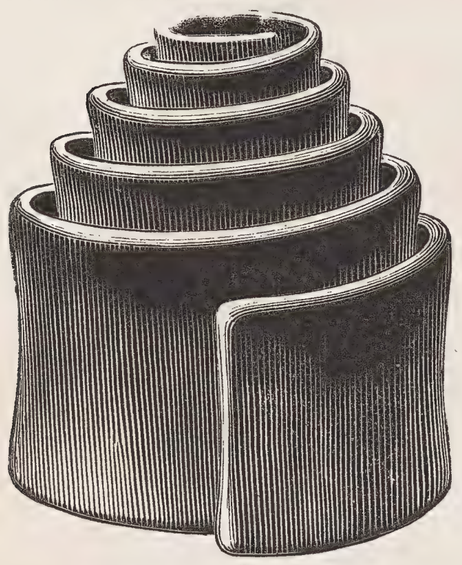

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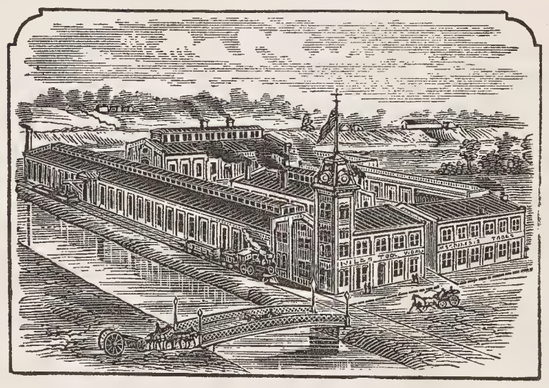

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Capacity, Six Cars per Day.

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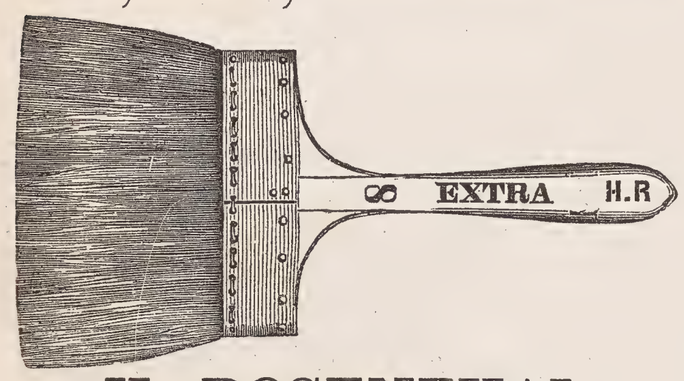

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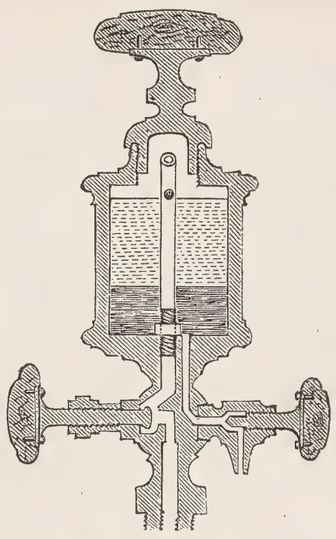

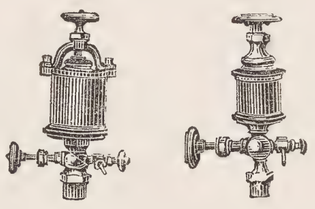

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FOR SHAFTINGS AND ENGINES.

These Oil Cups have a wide renown for their reliability and economy, which makes them the favorite with every Engineer and Mechanic who has them in use. They are made in different styles and sizes, but all work on the great principle of a free and perfectly automatic action on the bearing, and only when the machinery is in motion.

We call particular attention to our

SELF-ACTING LUBRICATORS FOR CYLINDERS.

Their advantages over other lubricators are so striking that it is only a question of time for them to come in general use, their accuracy in keeping the valves and pistons thoroughly and constantly lubricated being unequaled.

The principle of working is based on an intermittent condensation of steam in the *upper part* of the cup containing the lubricant. At every couple of strokes the steam, condensing, produces a drop of water, which, being heavier then the oil, sinks by its own gravity and raises a corresponding drop of oil over into a tube, which arises in the centre of the cup and conveys said oil directly to the chest and cylinder, this tube being the only connection from the lubricator to the internal part of the engine. The water produced by the condensation is drawn off once a day by a side-cock, and the cup filled again with the lubricant. Another advantage is, that the condensing process refines the oil, as the water settling down through the lubricant carries down salts and acids which may be contained therein. In this way corrosion of the steam-chest and cylinder is prevented, the power of the engine improved, and an amount of packing saved.

These lubricators have been adopted on ***thousands*** of stationary and marine engines, steam-pumps, steam fire-engines, and on locomotives by over ***eighty railroads*** in the United States.

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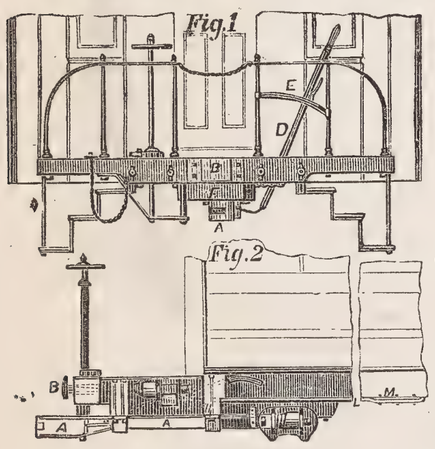
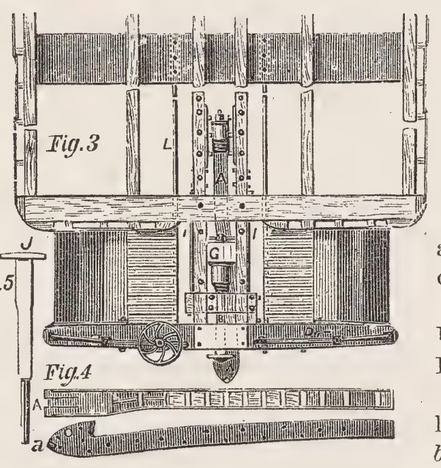
MILLER'S TRUSSED PLATFORMS. Compression Buffers and Automatic Couplers for Railroad Passenger Cars.





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Send for Illustrated Pamphlet, and call and see working models. **E. MILLER, Patentee.**

DESCRIPTION.

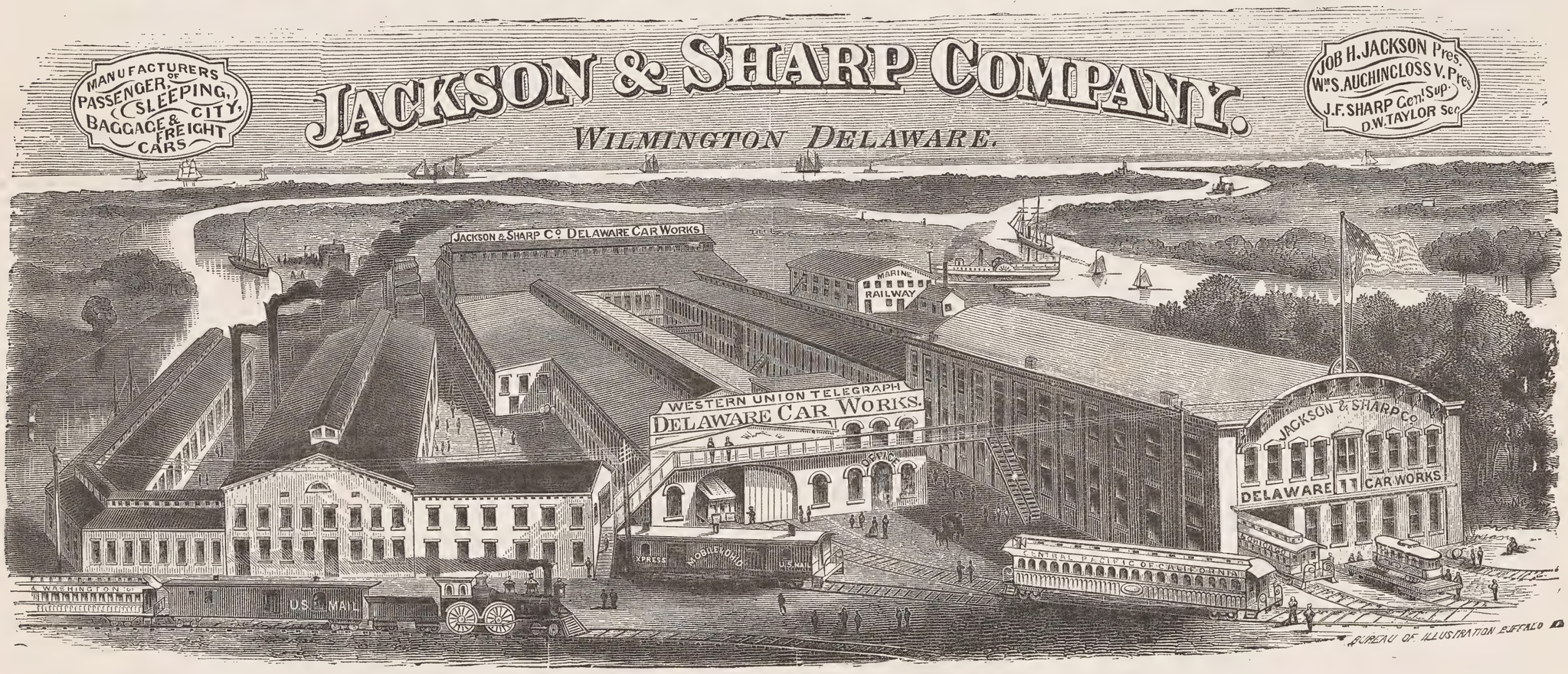
Figure 1 is an elevation; Figure 2, a longitudinal section; Figure 3, a plan of an end of a car to which the arrangement has been applied: and Figures 4 and 5 show top and side views of the "Hook" and "Buffer," drawn on a larger scale than that of Figures 1, 2, and 3.

The letters refer to the same parts in all the figures. A is the coupling "Hook," B the "Buffer," C the "Stop," D the "Lever," E the "Quadrant Ratchet," F the "Truss Beam," G the "Spring Beam," H the "Suspender Beam," I the "Upward Trusses," K the "Main Spring," L the "Downward Trusses," and M the "Bolster."

The Platforms, instead of being located below the centre line of the main sills of the cars, are placed *in* that line, and held there by the Trusses I and L, so that the point of contact (in Buffers B) is *in* the said centre line and *not below* it.

The coupling "Hook" A is attached to the draw spring the same as the ordinary draw head, and at the same height above the track, but in such a manner that the outer end is free to move laterally for a short distance. The Coupling Hook projects beyond the platform. The Stop C is placed under the Buffer Beam to prevent accidental uncoupling. When two cars are brought together, the Coupling Hooks, from *their shape*, push each other aside, until the Buffers B are compressed hard on the Buffer Springs, then—*the points of the hooks having passed each other sufficiently far*—the Hooks are carried forward by their main-springs, and thus the "*Coupling*" and "*Compression*" are both effected automatically *and at the same time*, and without the use of links and pins. When two cars are thus coupled together, the *head* of the *Hook* of each car is under the Buffer Beam of its opposite car, and the platforms are close together, (about 4 inches apart.) The effect of this is, *one platform can not be forced over the other*, nor can a *child* fall between the platforms; the dust and rain are nearly all shut out; the "Compression" makes the train run steadily, and prevents all jerking at starting and stopping.

DELAWARE CAR WORKS,



Manufacturers of Sleeping, Saloon, Drawing-Room, and Passenger Cars. Employs 760 Hands.

THE NATIONAL CAR BUILDER.

DEVOTED TO THE INTERESTS OF RAILWAY ROLLING STOCK.

Vol. III. No. 2. | AUGUST, 1872. | 50 Cents per Annum. Single Copies, 10 Cents.

Cleveland Bridge and Car-Works.

We copy from a Cleveland paper the following description of these works. The proprietors are the McNairy & Claflen Manufacturing Company. The business of the concern has increased so rapidly within the last few years, that the works now cover an area of seven acres. The Vice-President of the company, Henry M. Claflen, Esq., is a gentleman whose enterprise and business capacity, no less than his agreeable personal qualities, are widely recognized in railway circles at the West and elsewhere; and his connection with the business, in filling the important position he occupies, has contributed largely to its success:

"This concern was established in 1850, and moved along slowly until about seven years ago, when every thing in the city seemed to take a fresh start on the highway to prosperity. The Bridge and Car-works joined in the race. The recent purchase of more land, the employment of more men, the design to erect a large foundry this season, the rapid increase of orders for work, and the fact that present contracts will push the shops to their utmost capacity until December, are indications of extraordinary success. The development of this gigantic business has not been of a spasmodic nature, but steady, rapid, and healthy, and under practical management throughout. It is the only establishment in the country that combines the manufacture of railway and street-cars and bridges. They have facilities for building first-class passenger-coaches, but dropped this line of business more than a year ago, on account of the great demand upon their capacity for other kinds of work.

"Five hundred and fifty men, practical mechanics, are employed in the shops, and in putting up bridge-work all over the country. From 30,000 to 40,000 feet of lumber is required for daily consumption, and a little less than sixty tons of wrought and cast-iron. Fifty railway-cars, beside bridge and street-car work, are turned out each week. The workmen are just completing the last of fifteen hundred cars for the New-York Central Railroad, and are under way with a contract for three hundred coal-cars for the Cleveland and Pittsburg road. Bridge-work is under way for the following railroads: Lake Shore; Tuscarawas Valley; Ashtabula, Youngstown, and Pittsburg; Buffalo, New-York, and Philadelphia; Atlantic and Great Western; Ohio and Mississippi; Cleveland, Mount Vernon, and Pittsburg Railroad; Cleveland, Columbus, Cincinnati, and Indianapolis Railroad; and Canada Southern. The Canada Southern bridge is about three thousand feet long, and spans the American side of Detroit River, from Grosse Isle to the Michigan shore. The contract on this work includes the superstructure, as well as substructure, and the whole is to be completed by December 1st, 1872. The bridges for the Richmond and Atlanta Air-Line road, which is four hundred miles in length, are built by the McNairy & Claflen Manufacturing Company, and there are quite a number of them. The iron is shipped from Cleveland, ready for framing, and whatever wood-work is necessary is obtained along the road.

"Street-cars are made and shipped to almost every point in the United States, from Boston to New-Orleans. The white-wood in these cars is obtained within a radius of one hundred miles from Cleveland. It is precisely the same that is shipped to New-York and made into cars there, to be returned to the Western market. With iron and wood near at hand, and skilled labor as low as the same can be had elsewhere, it is not reasonable to suppose that these cars can be furnished upon better terms from any other point. A large number are kept in stock, of all sizes and styles, so that street-car companies can safely anticipate an early shipment of any number ordered. No other car is in use at Cleveland, and we are free to say that the cars of this city can not be surpassed for beauty, durability, and easy motion. The latter qualification is derived from a patent running-gear, giving the car a motion similar to the easy swing of a palace passenger-coach, and its introduction on any road will prove popular with the people. The Cleveland Bridge and Car-works are organized in six divisions—paint, pattern, blacksmith, machine, railway-car, and street-car shops—with a foreman over each, and one superintendent over all. These men are selected on account of superior mechanical ability and executive capacity, and through long service in the employ of the firm have shown commendable zeal in turning out work promptly and in accordance with specifications. The machinery intrusted to their care includes every variety that can be of advantage in saving labor and obtaining quick results. It is driven by three engines, all receiving their power from boilers sheltered in a brick house, separate and apart from the other buildings. Steam is conveyed from the boilers to the engines, and to the heating apparatus in each department, by subterranean pipes, removing danger from fire to a point where it can be under the most perfect control. One of Holly's fire-pumps, with hose constantly attached, stands ready for action in case of fire, while other improvements for quenching flames are found in almost every nook and corner of the vast edifice. A regularly-organized fire department, composed of men in the shops, some of whom are on duty night and day, have charge of appliances for creating a young deluge at a moment's notice."

Refrigerating-Cars.

Mr. Ellsworth Ely, of Lockport, N. Y., has invented a car for the transportation of fruit, in which, with a small quantity of ice, the temperature may be kept thirty degrees below that of ordinary summer heat, and at the same time free from moisture. The car has two spaces of air overhead; the upper space has an out-door ventilation, through which the solar heat is compromised. There is a space of dead air under the floor and all around the car. At the forward end of the car there is an ice-chamber partitioned off, four feet deep by the width of the car, with a door in the bottom of the partition through which the descending cold air passes into the car. Fruit taken from an atmosphere of eighty to one hundred degrees and placed in this car will, through its natural fermentation, throw off pounds and pounds of water. This warm, moist air rises through a wire screen in the back end of the car into the lower space of the ceiling. Passing forward to the ice-chamber, it is there brought in contact with the many surfaces of the ice-blocks, and so condensed, the drip passing from the car through apertures prepared for it. By this method a constant current of air is effected, even while the car may be standing. This process goes on until the temperature is equalized. To aid this current there is clamped around the forward axle of the car a friction-wheel, against which a leather-covered wheel is pressed by a steel spring. This wheel runs a vertical shaft, at the top of which, in the ice-chamber, there is a fan attached, whose revolutions throw the cool air through the car.

The Ohio Falls Car-Works.

We take pleasure in announcing that these works, which were destroyed by fire a few months ago, are being rapidly rebuilt with many improvements upon the old ones. The new buildings will be about thirty in number, constructed of brick in the most substantial manner, and fire-proof. The dimensions of the principal ones are as follows: Large wood machine-shop, 230 by 82½ feet; small ditto, 108 by 37, the first being designed for working heavy lumber, the second for lighter material; blacksmith-shop, 200 by 90; iron machine-shop, 110 by 82; foundry, 322 by 88—the largest west of the Alleghany mountains; wheel and axle-shop, 62 by 55; truck-house, 70 by 35; three erecting-shops, 126, 111, and 96 feet long respectively, by 47½ wide; two erecting-shops, 105 by 140 feet long respectively, by 77 wide; machine-shop, 140 by 60; cabinet-shop, 140 by 75.

Besides these, there will be three sets of engine and boiler-rooms, a pattern-shop and sundry store-houses. The roof is already on the large wood machine-shop and several others of the more important structures are in a good state of progress. It is expected that by the month of August, the works will be in a condition to commence the building of freight-cars.

A new design for a suspension railroad in Broadway has been brought out, and consists of a roadway supported by parallel cables running across the street and anchored to the party-walls of houses; brace-cables or rods being used to keep the roadway in position, and to prevent the vibratory motion. The anchorage of the main cables is to consist of cast-iron plates let into the party walls, on both sides of which steel cables pierce the front walls. In addition to the cross cables, diagonal cables will be used to support the roadway at the street crossings. Two single narrow-gauge tracks are proposed, one for the east and one for the west side of the city.

Flooring for Shops.

BY W. E. PARTRIDGE.

THE flooring in railroad car-shops is perhaps the least satisfactory part of those structures. In the paint-shops especially, it is, as a rule, in a miserable condition. Exposed to a great heat nearly all the time, the planks warp and become concave on the upper side, thus forming so many little troughs to hold the water with which the floor is constantly wet. Planks laid on the ground rot very speedily, and when laid on timbers are only a little more durable.

The estimated cost of a good pine floor, laid upon cross-timbers, is from four to five cents per square foot, or from forty to fifty cents per square yard. Such a floor can be made to last about five years, though a floor usually gets pretty bad at the end of four. An average paint-shop floor would not be tolerated in any other shop.

The New-York and New-Haven Railroad paint-shops at New-Haven have floors of so-called asphalt or mastic, but they are really coal-tar and gravel. So far as appearances go, they seem to meet the requirements of a perfect floor. Without any increase of expense, they are graded so as to give perfect drainage, and at the same time they present a continuous surface, without cracks or joints to catch dirt and dust. They are water and fire-proof; and on account of the perfect drainage which they afford, cars can be washed with perfect freedom, without rendering the shop damp, as a few seconds suffice to sweep the water all off to the drainage openings. When solidly laid, and of from 3½ to 4 inches in thickness, these floors are strong enough to allow cars or even locomotives to be jacked up on them. The latter has been done on the round-house floor at New-Haven, at the Boston and Providence round-house in Boston, as well as at several other places where these floors are in use. Being under cover, and protected from the direct rays of the sun, these floors will last much longer than the coal-tar pavements frequently laid in streets. How long they will last is a question that can hardly be answered in a conclusive manner. Some of them now in use have been down five years and upward, without any sign of decay. Many of them seem good for ten years longer. There would be no hesitation in calling the floors indestructible if it were not for the fact that coal-tar is volatile, and will evaporate in time. Under cover, it will take many years, however, for evaporation to seriously diminish its adhesiveness. The first cost of this floor is estimated at about 50 cents per square yard, which, if it lasts but six years, would make it a far more economical floor than wood. If it will last ten years, there would be a saving of forty cents per square yard over a framed wood floor.

The proper material, however, for these floors, is not coal-tar, but asphalt—either the imported or the prepared American, which is better. This is costly, but, at the same time, is perfectly indestructible. On the latter point, there is no doubt whatever. It is very like coal-tar, but is not volatile; is very tough, and does not melt below 300° Fahr. On account of its cost, the proper way to prepare a floor would be, after carefully ramming the ground, to put down a layer of broken stone, and cover that with sand, raked smooth and graded, on which the asphalt could be laid. A thin coat of lime mortar instead of the sand would make a capital foundation for the asphalt. If the foundation was concrete, the floor would be much the better for it. The estimated cost of a layer of concrete for ordinary situations is from 55 to 75 cents per square yard. This of itself, if well laid, would make a most admirable floor, equal in all but one or two respects to coal-tar, and in durability superior. Its faults would be a liability to crack under a very heavy blow. A thick coating of Grahamite, or asphalt, not more than an inch thick, would be a perfect protection, and give a floor practically indestructible under the worst usage, even of a machine-shop. According to careful estimates made by gentlemen accustomed to the use of asphalt, the cost of a floor laid with it upon concrete, or upon sand, and not exceeding an inch in thickness, would be $1.40 per square yard; the total expenses when finished, being, say, from $1.50 to $1.60 per square yard. This coating could be laid upon a thin layer of lime mortar, placed directly on the sand, ground, or broken stone. Whatever is used, the ground should be well rammed. The first cost is much greater than that of a good wooden floor, but that begins at once to deteriorate perceptibly, while years of use do not show any signs of wear in these floors, even when laid with coal-tar; while one of asphalt is practically indestructible. This latter article, from its peculiar character, might with advantage be used in all shops which need flooring.

Hot Boxes.

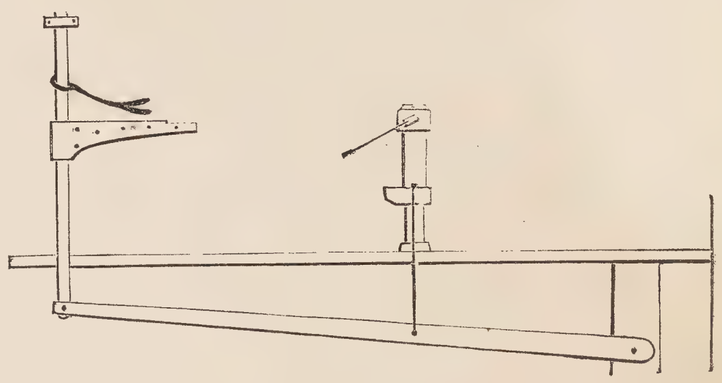
THIS serious inconvenience in railway operation, and a source of grumbling to the traveler on the delayed train, seems to have stimulated efforts in the right direction to devise a remedy in some form. At the Car-Builders' Convention it was the subject of a full discussion; and the different kinds of journal-bearings, their form and material, and the practical workings of different combinations of metal, were considered. Yet hot boxes will probably exist, and the stench of burning fats will greet the traveler's beak, even if he does not expose it by leaning out from the car-window to see the brakeman season the "fry" with ashes, soap, salt, or other condiments.

From an examination which we made of a dozen cars at the depot yard of one of the railways here, we are inclined to believe that these car-builders might find several ounces of prevention while looking for the pound of cure. Among several freight-cars, chosen promiscuously from a large number in the yard, we found six journals that had no packing; in about a dozen the packing was dry and rotten; in some the packing was so hard and full of sand that the journal was pretty well polished; and on many other cars the lids of the boxes were loose, and some were open so that the dust could easily settle in them. Now, we do not believe that these cars were in any worse condition than cars of other roads; but we do think that cars loaded and used in that condition would be apt to have hot boxes if the bearings were made from any thing but indestructible ice. Experienced engineers say that "twenty pints of good oil will lubricate eight car-journals for a wear of 5000 miles, and properly-constructed boxes and brasses should give a much better result." But the wear of journals is not always alike. Could not some arrangement be made whereby trains could have an oiling station, the same as engines have a water and fuel station? Two men promptly at hand to begin work as soon as the train stopped would in ten minutes supply with oil all the journals needing it on an ordinary train. Where the train is a long one, and time is limited, the brakemen could assist in oiling. By adopting a style of boxes with a lid that could be removed easily and quickly, and could be closed securely, keeping the journals clean, packed, and oiled properly, and having bearings with as little soft metal as possible in their composition, the number of heated journals could be greatly reduced.—*Railway Review.*

Extemporized Hydraulic Crane.

IN the shops of the Northampton Company at New-Haven they have an excellent Philadelphia-built car-wheel drill, which, unfortunately, lacks any apparatus for getting the wheel from the floor to the table Owing to the very small space between the eye of the wheel when in the drill, and the framing, a pair of ordinary hoisting-blocks could not be used, nor a derrick of any common pattern. To meet the case, the following plan was adopted by the foreman, Mr. Sweeny, which seems rather a novel one: Two boxes, similar to journal-boxes, were bolted to the frame at one side, one near the top and the other well down to the floor. In these, a turned two-inch iron rod was put, and the boxes left loose, so the rod could slide up and down or turn on its axis. This rod, which forms the mast of the crane, carries a jib about a foot and a half long, and has play enough so that when clear down the eye of a car-wheel just reaches up to it; and when raised to its full extent, the wheel can be swung into place on the drill-table. A loose arm is arranged to drop down and hold the wheel in place. The mast itself is prolonged below the floor, and rests upon the end of a long lever, the further end of which is fast either in a post or in one of the sills. From the centre of this lever, a rod passes up through the floor, and is fastened to the foot of one of Dudgeon's ten-ton hydraulic jacks. By connecting the power at the centre of the lever, the motion of the crane is doubled, while there is an abundance of power to spare. Half a dozen strokes are sufficient to lift the wheel to its place, while the lowering into place is done to perfection.

This arrangement has all the steadiness of movement and perfect adjustment peculiar to hydraulic cranes, and for a great many uses is far superior to any other mechanical device, both on account of the firmness with which the load is held, and the ease with which the smallest and most delicate movements are made. We give a rough diagram, which will enable



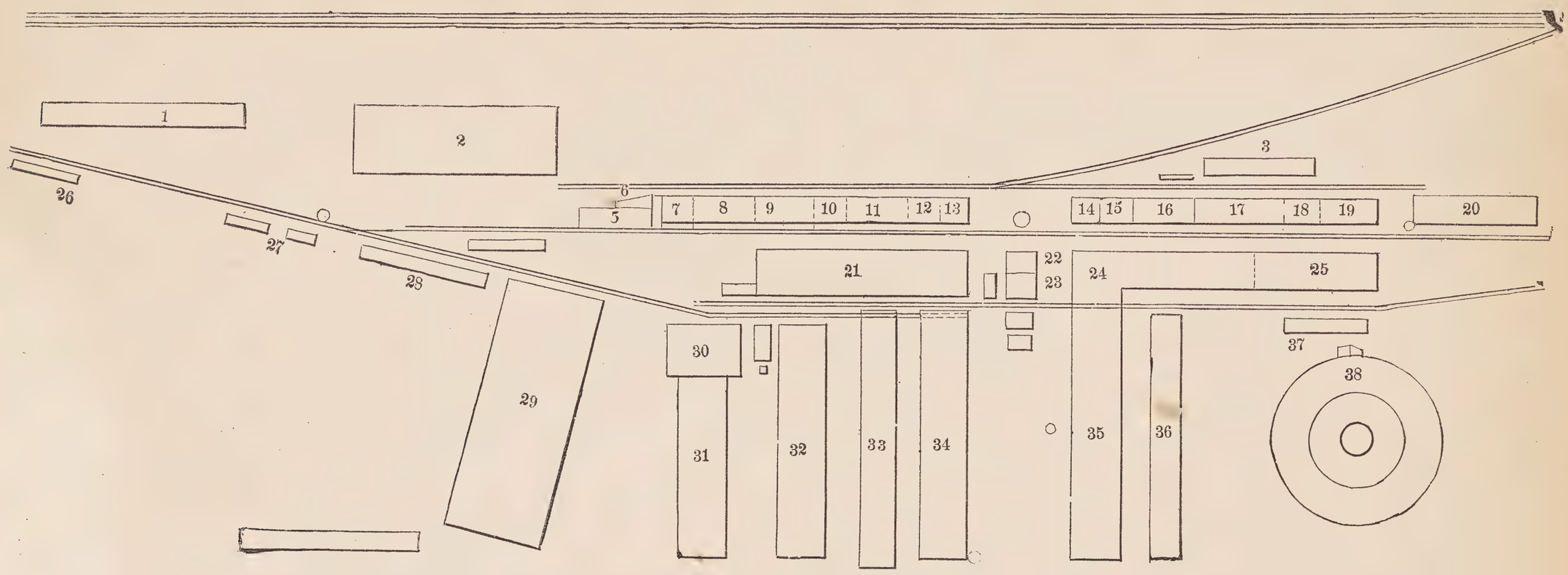
the reader to form an idea of the general relation of the parts. The jack was just far enough from the drill so that the handle was convenient to the man standing at the drill adjusting the wheel. Commenting on the cheapness of the affair, Mr. Sweeny remarked, "It is our wrecking-jack, and when we have to go off on the road, all I have to do is to take out the two nuts from the bolts holding the collar, and another jack is ready for use."

On the whole thing there seemed to be little more than a day's labor. Such an apparatus would be of the greatest value in putting heavy pieces of work on machines, especially when they have to be adjusted with some care. Almost every one can remember cases where such an extemporized hydraulic crane would have been just the thing needed. By modifying the construction, almost any reasonable lift can be obtained. There is hardly a shop in the country but has facilities for making one capable of lifting four or five tons four feet high, in the same length of time required to run out a jack under its full load. It is one of those mechanical "dodges" worth remembering, as there is no telling how soon there may be occasion for its use.

The Goodale Steam-Brake.

THE St. Louis *Railway Register*, June 21st, thus speaks of the Goodale steam-brake: "On Friday we had the pleasure of accompanying the members of the Car-builders' Convention on a trip down the Iron Mountain Railroad. The train, consisting of three coaches, equipped with the Goodale steam-brake, left the depot at about ten o'clock. At Pevely the train stopped, and the excursionists alighted to witness a series of tests of the Goodale brake. The trial was had under the supervision of Mr. Goodale and Mr. Soper, superintendent of the road. The fairest and most satisfactory trials resulted in stopping the train in twenty-two seconds with steam-brake, and thirty-six seconds with the ordinary hand-brakes. After the trial the excursionists proceeded to Hematite, where an excellent collation was served on the cars by the committee of arrangements. On the return trip another trial of the brake took place by simply pulling the cord, without giving the engineer previous notice. The train was stopped in twenty-one seconds.

REPAIR AND CONSTRUCTION SHOPS OF THE NEW-YORK CENTRAL AND HUDSON RIVER RAILROAD, AT WEST-ALBANY.



Ground Plan.

1, 2.—Paint-shops, 37 × 337, and 111 × 337.
3.—Foundry, 30 × 100.
5 to 13.—Various purposes, 40 × 501.
14.—Offices,
15, 16.—Pattern-shop,
17.—Foundry,
18, 19.—Blacksmith-shop, } 40 × 501.
20.—Forge-hammer Shop, 50 × 200.
21.—Wood-machine Shop, 80 × 350.
22, 23.—Engines and Boilers, (main power.)
24, 25.—Locomotive Machine, and Blacksmith-shops, 60 × 501.
26.—Freight-platform.
27.—Oil and Waste-house.
28.—Lumber-shed.
29.—Freight-car Repair-shop, 160 × 420.
30.—Machine-shop, (Car Department,) 80 × 120.
31.—Blacksmith-shop, 80 × 300.
32.—Passenger-car Shop, 80 × 380.
33.—Transfer-table—Pit, 60 × 416.
34.—Freight-car Shop, 80 × 400,
35.—Locomotive Erecting-shop 80 × 501.
36.—Transfer-table—Pit, 50 × 396
37.—Iron-store.
38—Round-house, 278 diameter.

The consolidated New-York Central and Hudson River Railroads constitute a main line 441 miles in length, reaching from Buffalo to New-York City. The lateral and branch lines, under the control of the consolidated companies, will make in the aggregate nearly as many additional miles. The traffic of this great artery of communication between the Lakes and the sea-board requires 424 locomotives, 448 passenger-cars of every class, 130 baggage, mail, and express-cars, and about 9000 freight-cars; besides a quantity of miscellaneous rolling-stock not regularly classified. As an index of the extent, activity, and steady increase of this traffic, there are at present in use on the first hundred-mile division of the New-York Central Road proper, 97 locomotives, making an average mileage of 3000 each per month, only three of them being in the repair-shop at the time our information was obtained. This is a fair criterion for estimating the work done on other sections of the road. In this connection we will state that the stock of engines now in service will be increased in a few months by the addition of 43 new ones, 5 of which will be put on the Hudson River division, and 38 on the Central. They will be built by the Schenectady Locomotive Works, and will prove a much needed reinforcement to the present capacities of the road. An idea of the increase of the freight business may be formed from the fact that four years ago there were only 12 or 14 freight-trains per day each way, while now there are more than twice that number. Could the whole line by some magic process be reduced to a miniature scale so as to afford a bird's-eye view of its entire length, with its endless succession of moving trains, some adequate conception might be formed, not only of the amount of business done, but also of the tremendous wear and tear attendant upon such an enormous aggregate of bumping, pounding, and friction—so great, indeed, as to require the active exertions of an organized army of skilled mechanics to keep things from going to inevitable wreck and dilapidation. The construction and repair of this immense quantity of rolling-stock is one of the important features of this line of road, and we shall attempt to give our readers a brief description of the shops where nearly all the repairing and much of the construction is done, our information being obtained by a personal inspection of the works, aided by the facilities kindly afforded by the gentlemen in charge of them.

These shops are situated at West-Albany, on the line of the New-York Central Railroad, about two and a half miles from the central part of the city proper, and cover an area of about 60 acres, exclusive of as much or more additional space used for incidental purposes. The grounds are intersected by more than thirty miles of track. The number, size, and relative positions of the various buildings, are shown in the accompanying diagram. In magnitude, completeness, and special adaptation to the purposes for which they are designed, they are not surpassed by any others of the kind in the country, being fitted up throughout with all the mechanical appliances for executing with economy and dispatch the work required to be done; and also affording storage-room for materials and fixtures of every description. The structures are of brick, with slate roofs, and vary from 300 to 500 feet in length. The arrangement and general plan of the whole are on a scale proportioned to the extent of the service required. The importance of ample space for the distribution of machinery and convenience of workmen, in every department, has not been overlooked. Organization and system are everywhere apparent. There is no idling, hurry, or confusion, and every employee seems to have his work well in hand. The entire working force is about 1600 men, including regular and miscellaneous employees of all grades, and divided as usual between the two general departments of locomotive and car construction.

THE MAIN POWER.

A building centrally located is exclusively devoted to the main motive power, one portion being occupied by the boilers, and the other by two low-pressure engines, one of which is an upright cylinder 34 inches in diameter and 6-feet stroke, and the other a horizontal cylinder of smaller dimensions, their capacity being rated at 200 and 125 horse-power respectively. The smaller one can be worked in connection with the other, or not, as circumstances may require. The fly-wheel is 20 feet in diameter and of corresponding weight. The steam is supplied by four boilers, and the necessary fuel is furnished from the contiguous wood-cutting shops, from which it is conveyed to the fire room by a chain elevator. Another engine of 75 horse-power is located in proximity to the machine-shop of the car department, the aggregate capacity of the three engines being 400 horse-power. They all work as quietly and effectively as the most fastidious engineer could desire.

THE CAR DEPARTMENT.

All the shops embraced in this department are under the general control and supervision of Mr. Joseph Jones, the master car-builder, who is a veteran in the service of the road, having been connected with it for a quarter of a century. His long experience, and intimate knowledge of all the mechanical details pertaining to this department, eminently fit him for the responsible position he holds. Each shop is under the immediate charge of an efficient and competent foreman. The number of new cars built is at present comparatively small, owing to the great amount of repairing necessary to keep the freight and passenger equipment in a condition for the active service required. Much the largest portion of disabled cars of every class come from the Hudson River division. This is evident from a glance at the interior of the repair-shops, which have somewhat the appearance of a car hospital where the infirm, crippled, and battered vehicles are being recruited for a new lease of life. The work of restoration, however, is so thorough and complete that, after receiving the finishing touches in the paint-shop, they appear as good as new, and with scarcely a trace of former debility. A number of old passenger-cars were being equipped with the Miller platform, and we were told that it is the intention to attach this excellent device to all the old passenger stock on both divisions of the line—a very conclusive argument in its favor, if such an argument were necessary.

Among the new cars in progress, we noticed some specially designed for the transportation of horses. They are 29 feet long by 8 feet 6 inches wide, outside

of sills, and about 6 inches higher than the ordinary cattle-car. The sides are sealed to within 18 inches of the top to protect the animals from the wind, the remaining space being slatted so as to freely admit the air. Forty of this style of cars were being built. We also noticed a new combined coal and platform-car, 100 of which were in course of construction, designed to be used for either purpose indicated by their name. They are 29 feet long by 8 wide, and built entirely of Southern pine, with sills 4½ x 11½ and floor timbers 8 x 4½. The ends and sides are 20 inches in height, the latter strongly bolted to the sills; but the ends are hung on hinges so as to be taken off when required. In the centre of the flooring are dump-doors, worked by a transverse iron shaft with ratchet-wheel and cams attached on the outside. The cars are all equipped with Jones's sliding-brake, an illustration and description of which may be found in No. 9 of THE CAR-BUILDER. It is hung between the wheels, and slides on the jaw-brace, with no danger of becoming displaced. It is in such general use on this and other lines of road that its merits need not be dwelt upon. Several Wagner drawing-room coaches were in the shops undergoing repair, but no new ones were being built. Under some of these coaches we noticed a very superior style of 4-wheeled truck, which we may hereafter illustrate and describe more particularly. The axles are seven feet from centre to centre, with Dinsmore springs on the equalizing-bars, and six elliptics on each side, the four central ones containing two leaves and the outer ones three leaves each. This style of truck is much lighter than the six-wheeled pattern, and gives as easy a motion to a car in every respect.

THE CAR-SHOPS.

The number, size, and relative position of the several shops in the car department are very clearly shown in the accompanying ground-plan. Besides the construction and repair-shops, and others designated in the references above, there are included in these a house-carpenter shop, where doors, blinds, tanks, bridge-work, etc., are made; and also a tin sheet-iron, and plumbing-shop.

A Transfer Table with a pit 416 by 60 feet is located between the passenger and freight-car construction shops, and is worked by machinery in the wood-cutting shop. Its movement is under the most perfect control, and is regulated with the greatest precision by means of a lever and brake. The platform will hold one passenger or two freight-cars, which may be taken in or out of the shops on either side at any desired point, by means of a capstan. There are 19 side-tracks leading from the pit to the shops. A more complete arrangement for handling cars with quickness and ease, it would be difficult to devise. Fifteen cars can be worked upon in the passenger-car shop at the same time.

The Blacksmith-Shop of the car department is a model structure of the kind. Its form and dimensions are shown in the diagram. Eight stacks with four fires each are located in a line on each side of the building, at such a distance from the side-walls and from each other as to afford ample space for the movement of workmen and handling of material, as well as for a wide central passage-way. There are 66 fires in all, affording facilities for turning out every description of forging, except the heavier kinds, used in the construction of cars. Adjoining this building, and constituting a part of it, is the machine-shop, a spacious and well-lighted room provided with all the requisite machinery for finishing axles and fitting wheels. Over this shop, on the second floor, is the trimming-shop, where every thing in the category of car-trimming, including brasses of every kind, racks, lamps, window-fixtures, etc., is finished and got ready for use.

The Paint-Shops are commodious structures, of convenient access, and well adapted to the work for which they are designed. The larger one admits of thirty passenger-cars being worked upon at a time. The ornamental finishing of some of the day and drawing-room coaches displays a high degree of artistic taste and skill, both in interior and exterior decoration, and is well suited to meet the requirements of the traveling public.

A capacious building is devoted exclusively to the storage of a great variety of materials and fixtures, embracing upholstery goods, trimmings, etc. Here are also stored, in summer, the stoves belonging to every class of passenger-cars, each labeled so they can be again returned to the identical car from which they were taken. The seats displaced by stoves in winter are also stored here, and labeled in the same manner. In connection with this department, is a room for repairing and renovating old seats. An important part of this work is done by a machine which is fed with worn, soiled, and dusty cushions. They are laid on the feeder in pairs, and, as soon as they get inside, are subjected to a tremendous thrashing by two sets of pounders, worked with great rapidity by the machinery, the dust in the mean time being expelled into the outer air by an exhaust fan. The machine does its work effectively, and with such rapidity that hundreds of seat-cushions may be cleaned of dust in a very short space of time.

A Wrecking-Car, completely equipped for service, is kept in constant readiness for any emergency requiring its use. It is forty-eight feet in length, with a forward platform and derrick. Inside are all the tools and requisites for repairing a damaged track and clearing it of obstructions in the shortest possible time.

In connection with the premises are two Lumber-Yards, containing altogether about eight million feet of seasoned lumber, including oak, Norway, white and Southern pine, ash, white-wood, walnut, etc. Each pile is marked with the quantity originally contained in it; and by deducting therefrom what is used, a correct estimate can at any time be made of the stock on hand. The sources of supply are mainly Michigan, Canada, and Georgia.

FOREMEN OF CAR-SHOPS.

The foremen of the shops in the car department are as follows: Wood-cutting shop, Frederick Johnson; freight-car repair-shop, Lafayette Case; paint-shops, John Burch; passenger-car shop, George Schermerhorn; general-repair shop, Andrew Fraser; machine-shop, Adam Gage; blacksmith-shop, Jefferson Thompson; house-carpenter's shop, Frank Fripp; tin, sheet-iron, and plumbing-shop, Richard Vanderbilt; upholstery, Jesse Jones; lumber-yards, James Graham.

In this connection, we mention the name of Mr. Alfred Harley, the skillful and experienced draughtsman, to whom we are indebted for the accompanying diagram, and who has charge of the car department in the absence of the superintendent; and we also add Mr. James Van Valkenburg, the inspector of cars at the Albany depot.

THE LOCOMOTIVE DEPARTMENT.

This department is under the supervision of Mr. G. B. Van Vorst, the master-mechanic, who has been connected with the road a number of years, and whose experience in the mechanical departments of railways eminently qualify him for his position. Owing to the immense business of the road, and the great number of engines in active service, the work done in this department is mostly repairing. The erecting, machine, blacksmith, and boiler-shops are all comprised in an immense building in the form of an L, as shown in the diagram. The main building is five hundred feet in length, and in this are the pits for the engines. The lifting is done by a jack stationed upon the truss-timbers of the roof, and capable of being moved lengthwise the building to any desired point. Here may be seen a number of engines recruiting for another term of service, by having cylinders rebored, boiler-plates renewed, and all traces of wear and tear obliterated by a thorough overhauling and repairing. Without going into unnecessary detail, it is sufficient to say that, in the fitting-up and general arrangement of these shops, every improved mechanical appliance, and every facility afforded by inventive skill, are brought into requisition in adapting means to ends for accomplishing the purposes intended. Order, system, and regularity are everywhere visible, and the work goes on effectively and steadily, without apparent effort, hurry, or confusion.

In the rear of the erecting-shop are the Round-House and Transfer-Table. The round-house is one of the largest in the country, being two hundred and seventy-eight feet in diameter, and containing forty-one stalls for locomotives. The transfer-table extends the entire length of the erecting-shop, and engines can be readily transferred from any part of the shop to any other part, or to the round-house. In connection with the latter, is the oil and waste-house, a substantial fire-proof building, containing an immense iron tank divided into compartments for different kinds of oil, and capable of holding, altogether, one hundred and fifteen barrels. The constant draft upon this reservoir is an evidence of the amount of lubrication required in operating railroads, and also affords an index of the enormous consumption of oil in the aggregate by all the roads.

The Forge and Hammer-Shop contains two steam-hammers, and numerous other appliances for turning out all the heavy forgings required by the entire line of road. The accumulated scrap is sent here from all points, from which a careful selection is made for axles. Those used on the road for the last six years have been made at this shop, and of this material; and such has been their uniform excellence, that no instance of breakage has occurred during that time.

The Foundry is in near proximity to the above-named shop, and also to the machine and blacksmith-shops. With the exception of car-wheels, every description of casting is here made that is required by the road, including engine cylinders and driving-wheels, frogs, etc.; and also the numerous brasses required for all purposes in the construction of rolling-stock. In connection with the foundry, is a device for breaking up the heavier kinds of scrap castings. It consists of a ponderous iron drop, which is elevated like that of an ordinary pile-driver, and when disengaged, comes down on the miscellaneous mass of iron underneath with a crash that multiplies the fragments indefinitely, and reduces them to a more suitable size for handling and melting.

In connection with the foundry, is the Pattern-Shop, in which every kind of pattern for iron or brass castings are made. On the second floor of this building are stored the patterns of all the castings used on the road, numbering a hundred thousand, more or less, and embracing every conceivable form and size, from a minature brass nut to a locomotive driving-wheel. These are all arranged, classified, and numbered, so that in case a casting of any particular one is wanted anywhere on the road, it can be designated by the number, a duplicate record of both the numbers and patterns being kept at various points along the line.

FOREMEN OF LOCOMOTIVE-SHOPS.

The following are the names of the foremen of the several shops in this department: Machine-shop, James Pratt and Peter C. Lander; erecting-shop, John Adams and Isaac Soul; boiler-shop, Thomas R. Blackburn; blacksmith shop, John Turnouth; foundry, Julius Myers.

PRECAUTIONS AGAINST FIRE.

Since the foregoing was written, the paint-shop of these works has been destroyed by fire, together with a large number of cars in the shop and immediate vicinity. Owing to favorable circumstances, and the use of all available means to arrest the progress of the flames, the other buildings were saved. The occurrence, however, served to demonstrate the necessity of a better supply of water than has hitherto been provided, as well as more effective means for bringing it to bear upon a fire. Heretofore, two tanks mounted upon six-wheeled trucks, and holding thirty thousand gallons of water each, have been kept in readiness; also a locomotive under steam, with a

force-pump attached, which could be instantly coupled to the tanks so as to take them, by means of the numerous tracks, as near the fire as possible. There are also on the premises one steam fire-engine and one hand-engine. These means would seem to be adequate for any ordinary emergency; but the disasters which have overtaken so many car-shops of late, prove the necessity of an ample supply of water as the first essential. Aware of this deficiency, a vigilant watch is maintained at all times, and the utmost care taken to avert a calamity from which they so narrowly escaped a few weeks ago.

The description we have now given of these works is by no means a full and complete one, but is only intended to convey a general idea, in outline as it were, of their extent and capacity. Our limits do not admit of any very great elaboration of details, which would, at the best, be but a twice-told tale to the majority of our readers, who are familiar with the ordinary mechanism and methods of car and machine-shops. The ground-plan and dimensions of the various buildings convey a better idea of the magnitude of the operations carried on than any merely written description. We conclude by expressing our acknowledgments to Mr. Jones, Mr. Van Vorst, and their subordinates, for their kindness and attention in showing us through the works and explaining the various features of interest.

Leonard's Balance or Tension Adjusting Wrench.

THIS device, designed for the use of engineers, architects, and mechanics, is for the purpose of indicating and applying any given limit of strain to rods or bolts. Although applicable for various purposes, it is particularly designed for use in the construction and adjustment of bridges and other similar structures, where it is essential that an equal or proportional strain shall be borne by all the supporting rods.

By use of this machine, the well-known difficulty of adjusting a tension-rod to the strain required to be resisted is effectually overcome by an automatical operation, and the proportion of strain on an indefinite number of rods ascertained and applied as correctly as the weight of any article is ascertained by use of the scales. By means of its special mechanism, the wrench ceases to operate when the desired strain has been obtained, without depending upon the judgment of the operator, which experience has shown to be only guesswork.

In operating it, the socket is placed upon the nut, and the wrench is placed over the socket. Power then being exerted in the proper direction, the nut is turned upon the rod in the usual manner, the return movement of the handle being effected similarly to the ordinary ratchet-wrench, the surface *d* of the pawl and the corresponding surface of the ratchet-wheel being of such an incline as will permit the parts readily to pass each other. When thus operated it differs in no respect from the ordinary ratchet-wrench; but when in using it a certain limit of strain has been reached, for which the wrench has been previously adjusted, it ceases to operate, because the face *d*1 of the pawl slips past the corresponding surface of the ratchet-wheel.

It will be observed that the principle of the operation is that the pawl is free to slip in one direction on account of the gentle inclination of the bearing-surface, while in the other direction it can not slip without the exertion of great pressure, because the bearing-surfaces are abruptly inclined, the amount of pressure required being determined by the pressure of the spring, which is regulated by the adjusting-screw.

The manner of testing the spring, to determine the amount of compressure required to cause it to hold the ratchet until a desired limit of power has been reached, is as follows: A rod is attached to a scale in such a manner that the strain of the weights applied to the beam of the scale is borne by the nut. The scale is then weighed with a given amount, the

Fig. 1

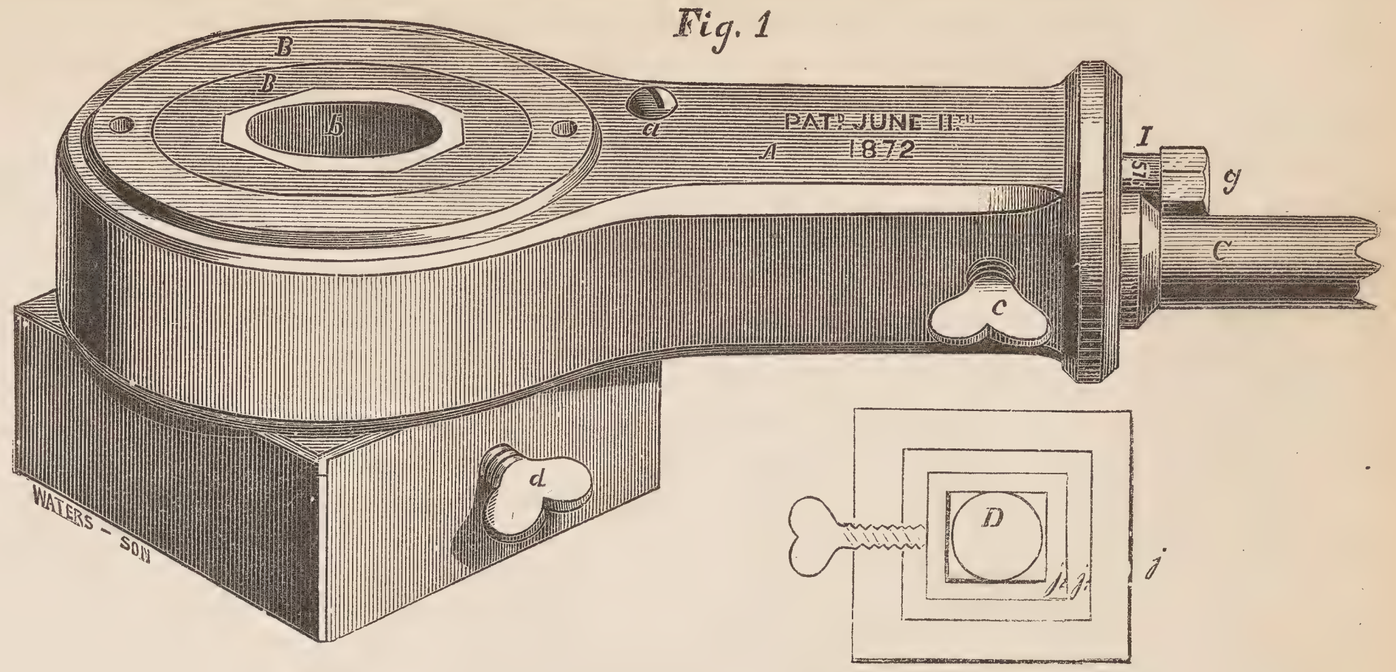


Fig. 1 represents a view of the wrench complete, adjusted and ready for operation.

Fig. 2

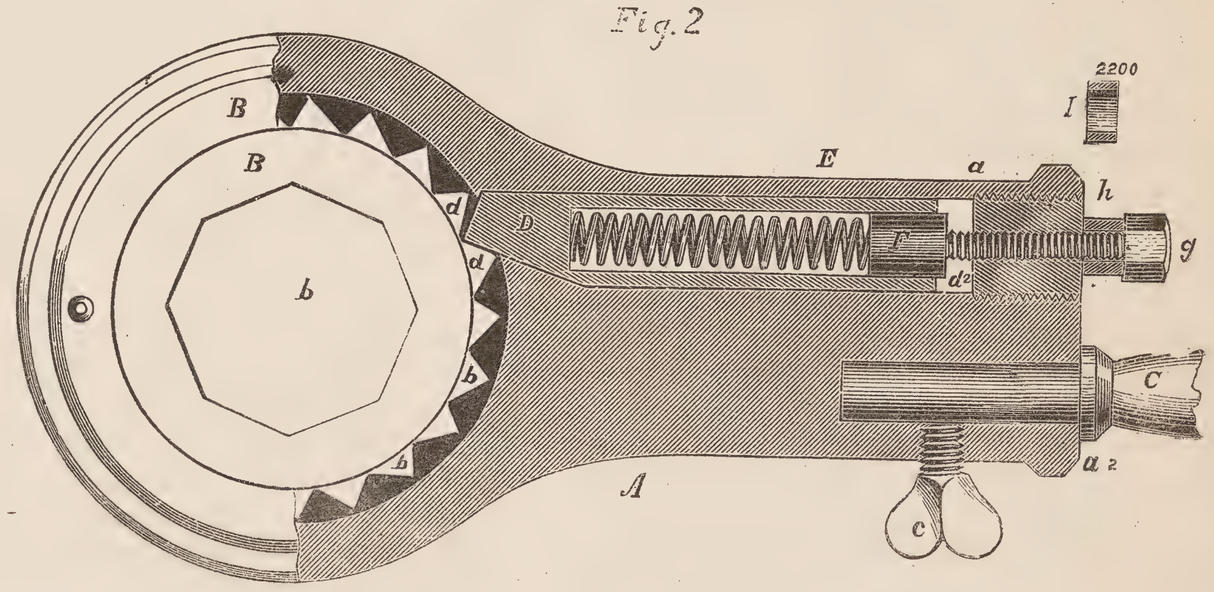


Fig. 2 represents a plan view partially in section.

A, the main portion or shell, constructed of tough brass or malleable iron, which is provided at one end with a circular opening for the reception of the ratchet-wheel *B*, and also with longitudinal openings *a*1 *a*2, for the reception of the indicating mechanism and for the handle *C*, which latter is held in position by means of the set-screw *c*, as shown.

The ratchet-wheel *B*, constructed of good steel, is provided on its circumference with a series of teeth *b*, and with a central opening *b*1.

*B*1 is a ring by means of which the ratchet-wheel is secured in place.

D represents a pawl or tongue of steel, provided at one end with the inclined faces *d* *d*1, and also with the central socket *d*2, in which latter is located a spiral spring *E*.

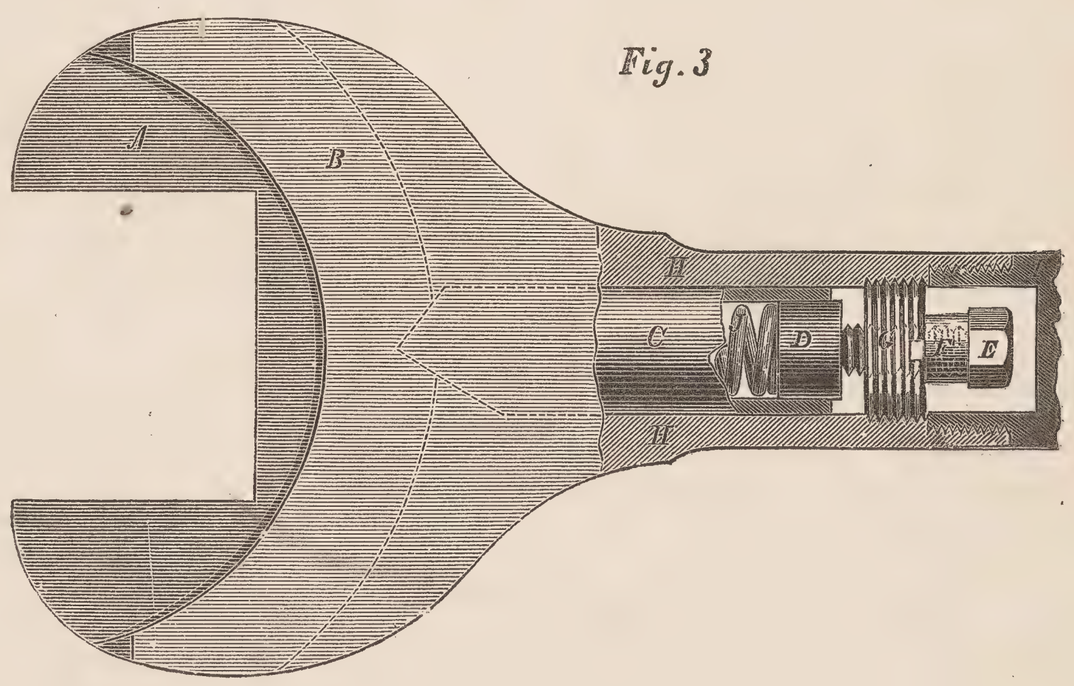
F is a follower adapted to slide easily in the socket *d*2, which is held in place and adjusted by means of the set-screw *g*, which latter turns in the screw-stopper block *h*, which closes the opening *a*1, of the shell *A*.

By adjusting the set-screw *g*, the amount of the pressure of the pawl against the ratchet-wheel is determined.

In order that this adjustment may be accurately made to indicate exact quantities, ferrules *I* of different widths are employed the amount of pressure exerted by each being previously determined by proper experiment.

D, Fig. 1, represents a reverse view of the socket upon which the wrench rests, and by means of which the attachment to the nut on the rod is made, *j*1 *j*2 being a series of bands which fit into the socket and into each other, in order that any sized nut may be operated upon.

Fig. 3



Here is represented a modification of the wrench, consisting of a pawl *C*, similarly arranged, which is employed in connection with an open jaw *A*, having a single recess for the reception of the pawl. The jaw is provided upon each side with a recess in which rest corresponding projections upon the shell *B*. When ready for operation, the adjusting-screws and spring are completely covered by means of the handle *I*. This form is designed for use in places where a closed jaw can not be applied. A number of jaws adapted to different-sized nuts are furnished with each wrench.

wrench being applied to the nut, which is then turned on the rod until the wrench ceases to operate. The position of the adjusting-screw is then noted, and a ferrule of proper width, when in place, to limit its movement to this point, is made and marked with the number of pounds weight upon the scale. The weight upon the scale may then be changed, and the position of the adjusting-screw again be found, and another ferrule be made as before.

In the practical operation of the wrench, these ferrules are used to adjust the spring, so that any desired strain may be applied to the rod, as weights are used on scales to determine the weight of any article desired.

In addition to the purposes before indicated, the wrench, as described in Figs. 1 and 2, may be used for testing the strength of materials, or for testing the strength of rods before being put in place, or in the manufacture of bolts and nuts for securing equal amount of friction in turning on the nuts. It may also be used for equalizing the strain of the standing rigging on vessels, and for a dynamometer, by placing it between the stationary power and the power to be measured by means of suitable coupling.

The original design, however, of this invention is to properly adjust or equally distribute the required strain upon the various rods or bolts used in bridges and similar structures. Heretofore bridge-builders have experienced great difficulty in securing even an approximation to this end, having to depend entirely upon the judgment of the adjuster, (which is known to be at best quite unreliable,) there being no rule or method of ascertaining the amount of strain obtained on any given rod. By use of this wrench, absolute certainty is reached in the adjustment of strains, and a consequent essential saving of material effected, as by reason of these unequal strains from one fourth to one third more iron is used than would be necessary if a uniform tension were secured. It is now being used by the inventor himself, who is a practical civil engineer and bridge-builder of twenty five years' experience, and who is at this time extensively engaged in the construction of railroad bridges on the Pacific Coast.

This improvement is specially interesting to railroad companies and operators, for, in the matter of adjusting the strains on bridges now in use, (both wooden and iron structures,) it is equally as applicable and useful as in the adjustment of the new structure when in course of completion. It has received the unqualified approval of all leading mechanics and engineers who have examined and witnessed its operation, and on examination will readily commend itself alike to railroad companies, bridge-builders, and mechanics generally as indispensable for the purposes for which it is intended.

Patented June 11th, 1872. For further information, address Leonard & Patterson, or Vose, Dinsmore & Co., 1 Barclay street, New-York.

Correspondence.

Lake Shore and Michigan Southern Palace-Coaches.

CLEVELAND, OHIO, July 12, 1872.

EDITOR OF THE NATIONAL CAR-BUILDER:

DEAR SIR: In view of the daily increasing requirements of a fastidious traveling public, great and progressive improvements are being made in the passenger equipment of all the leading through lines of railway. It is very evident that the line that can and will furnish the best and most comfortable accommodations for the fast increasing patronage, is the one that will be chosen by the majority of travelers; and in order to do this, a spirit of rivalry is generated productive of beneficial and important results, and gratifying to the lovers of the beautiful. It is no exaggeration to say that the passenger-coaches of the above-named road, in the essential points of good material, substantial workmanship, tasteful decoration, and the application of the most approved methods and devices for promoting the comfort of passengers, are not surpassed by any others in the country. A few of the many late inventions might be named here, such as the Miller platform, buffer, and coupler, the Westinghouse atmospheric brake, and the Baker & Smith heating apparatus, all of which are in successful use on this road.

The sleeping-coach line is under the control of the Lake Shore and Michigan Southern Sleeping-Coach Company, of which Mr. Gales is the superintendent; and no expense has been spared in making the cars of this company all they are represented to be, that is to say, first-class, in the latest railway signification of the term. One drawing-room and seventeen sleeping-coaches of this line were built at the Cleveland shops, and also a large number at the Adrian and Buffalo shops of the road. For interior finishing, black-walnut is so abundant, and has been so much used in consequence of its comparative cheapness, that it has become somewhat monotonous and commonplace, and an occasional relief from it is quite agreeable as a change, if for no other reason. It is being displaced to some extent by mahogany and other woods of a lighter and less sombre color.

A short time since, the writer had the pleasure of visiting the Cleveland shops of the company, and with the permission of Mr. Withyecombe, the master car-builder, and the polite attentions of the foreman, Mr. S. S. Langdon, he is enabled to furnish the matter embodied in this communication, which may not be devoid of interest to the readers of THE CAR-BUILDER.

THE "NORTHERN CROWN."

This is the name very appropriately given to the magnificent directors' coach, a beautiful specimen of railway architecture turned out about two years ago; but as I have not seen any descriptive notice of it in print, I will endeavor to describe it. The body is 60 feet in length, 10 feet wide, and the standard palace-car height, 9 feet 6 inches from floor to head-lining at the centre. The interior is divided into five apartments. In the centre is the grand drawing-room, 17 feet long and the full width of the car-body; at each side of this room are three extra large plate-glass, oval-top windows, 37 × 47 inches in size, and at each end is placed a large mirror. The furniture consists of a sofa-lounge, five easy arm-chairs, and an oval marble-top table. The sofa and chairs are upholstered with the richest Moquette tapestry, the appearance of which admirably harmonizes with its surroundings. Passage-ways at the side of the coach lead from the drawing-room to the lobbies or smoking-rooms at the ends of the body; and alongside of these passage-ways, and adjoining the centre, are state-rooms or sleeping apartments, about 7 feet square, each furnished with a sofa-bed and extra elevated berth, and two arm-chairs upholstered the same as in the drawing-room. Between the state-rooms and lobbies are located the toilet-room, water-closets, refrigerator, heater, and water-coolers. The smoking-rooms are furnished with arm-chairs, upholstered with drab Turkey leather, and two plain splint-bottom rockers, for the sake of contrast very probably. All the upholstered work is finished with special regard to the comfort and ease of the occupant. The floor is covered with the best English Wilton carpet, and the windows are shaded with heavy silk damask curtains instead of blinds. A leading feature of the interior is the fitting-up and distribution of the ornamental wood-work, which, to say the least, is perfect in form and design, each part and piece being the natural counterpart of the other. A short time since, the "Crown" was in the shop to receive some alterations, including a change of lamps. Formerly, chandeliers were suspended from the centre, but these were exchanged for bracket-lamps, termed the German student-lamp, four of which are placed in the drawing-room, and others elsewhere about the coach as needed. In making this change, it was necessary to re-paint the head-lining. Special mention should be made of this highly artistic piece of work, the execution of which is better than is generally found in railway-cars. I will not attempt any description; it must be seen to be appreciated. The exterior is certainly a manifest improvement on the style of coach heretofore built at this shop. Instead of putting the panels on lengthwise, they are placed up and down, with a circle-head at the top of each. There are three oval ones on each side, the middle ones containing a well executed landscape painting, representing the great industries of the age, and decided master-pieces. The end oval has the name "Northern Crown." The body color is chrome yellow, the uniform color of all the passenger-coaches of this road. The platforms are made sufficiently long and wide to form a good balcony without having a recess in the body, as is often the case with this class of cars. When the steps are not in use, a trap-door shuts down over them, thereby continuing the floor clear across the body. A fancy silver-mounted iron railing surrounds the platform, the ends forming gates, both ends being alike.

The superiority of this idea is very evident from the fact that the trouble and inconvenience of turning the car after reaching a destination are done away with, an item which can be best appreciated by railway employees if they have had any experience in turning a heavy coach when the turn-table was too short to receive it.

THE CHIEF-ENGINEER'S COACH.

While passing through the paint-shop, I noticed a very nobby little coach, receiving the furniture and final touches. This coach, I was informed, is intended for the chief-engineer of the road. It is only 42 feet long, and the uniform width and height. There is nothing about it which might be termed tawdry or flashy; every thing is in perfect keeping and in good taste. Here the order of arrangement is changed somewhat; there are two large apartments at each end answering the purpose of drawing-rooms or offices, and furnished with an eye to comfort as well as utility. In the centre of the coach is a double section or state-room, with a passage through its centre, and furnished with two sofa-seats at the sides, and two swing-berths above. Six persons can occupy this room very comfortably. Adjoining this is the toilet-room, heater, water-closet, etc. The windows are the same as in the ordinary day-coaches, with the exceptions of those at the ends, which are larger, of plate-glass, and stationary; the door-light is larger than usual, extending as low as the window-stool. In place of the wooden blinds, there are buff Holland shades hung on rollers. The large rooms will be furnished with articles appertaining to an engineer's office and parlor on wheels. The exterior is devoid of any thing to denote that the coach was any other than an ordinary passenger-coach, the design being the same.

On account of the shortness of the coach, it will ride on four-wheeled trucks, of the L. S. & M. S. R. R. pattern. In this connection it will be well to state that all the drawing-room, sleeping, and day-coaches on this road, over fifty feet in length, ride on six-wheeled trucks, and are all of uniform design and pattern.

THE "ARCTIC" AND "BALTIC."

Two extra fine palace sleeping-coaches, bearing these names respectively, have recently been turned out of the shops at this place. They are each 67 feet in length, and are the only cars of that length ever built here. There are seven sections on each side, and a state-room at one end, which has accommodations for six persons. This room is large and spacious, and the occupants can be perfectly secluded without interfering with the free transit through the car. It is furnished with a sofa-bed, two elevated berths, and two arm-chairs; all the bedding, etc., can be put away in the day-time, so as to give the apartment a perfect drawing-room appearance. The construction of the section-seats is worthy of notice. They are made to face each other, and not, as formerly, with the back to the outside of the car, which, to say the least,

is a very objectionable plan. The arrangement in these cars combines the greatest ease and comfort with perfect elegance. Each section has two windows with only one pillar between them, and the alternate spaces are occupied by a wide panel. The advantage of this is evident from the fact that by placing the windows in pairs close together, they answer the purpose almost as well as if the two were one, and the view obtained from within is equally as good. Only last week a 60-foot sleeping-coach, called the "Buffalo," was finished and turned out. This, and four others now in the shops at different stages of progress, are the same width as the coaches of Wagner's N. Y. Central Line of sleeping cars, in order that they may run through from Chicago to New-York. On account of the narrow cuts and tunnels on the New-York Central and Hudson River roads, the uniform width of coach-bodies on this road can not run through. One of the principal features of all the palace-car work done at this shop, is the ornamental wood-work of the interior finishing, consisting principally of solid woods, such as mahogany, and, in proper proportion, bird's-eye maple. The wood-carving, scroll-work, rosettes, brackets, etc., are all worthy of special notice, being of the very best material, executed by experienced workmen, and display throughout a taste which is not an eyesore to an observer of the beautiful. The metal-work is all silver-plated, and is restricted to proper limits. Mirrors are introduced with moderation, and more for convenience than for the purpose of duplicating every person in the car. Nothing further can be said by me in regard to these fine cars; but in conclusion would say that for comfort, luxury, and conveniences there is nothing wanted to make them fully up to the requirements of the traveling public. MACK.

Chicago, Alton, and St. Louis R.R. Shops.

WE copy from a Western exchange the following description of the car and machine-shops of this road, located at Bloomington, Ill. Mr. R. Reniff is superintendent of the car department, and Mr. J. A. Jackman of the machine and locomotive-shops. The works occupy an area of forty-two acres, owned by the company, and the buildings thereon were erected and fitted up at an expense of $550,000. Over 1000 men are employed. Here all the elegant passenger-coaches, the heavy and durable freight, baggage, and stock-cars are built and kept in repair, and here are made most of the locomotives used by the road.

The planing and wood-working shop is 200 feet long by 75 feet wide, and two stories high. This shop is in charge of Mr. L. E. Munson, foreman. The car-shop is 200 feet long by 80 feet wide. This shop is divided in halves—one for freight-cars and the other for passenger-coaches. Mr. Rushmore has charge of the latter, Mr. Buttolph of the former. Here the trucks are fitted and put together, and here also the body of the car is brought piece by piece from the first shop and joined on the truck. The windows, doors, sashes, seats, etc., are put in their places, and the car is finished to be painted. For this last purpose it is brought to the paint-shop, the third and last branch of the car department, in charge of Mr. McGrath. All the rolling-stock repairing is also done here, and the extent of that branch is best estimated when we learn that last year the expenses for repairs alone amounted, on passenger-cars, to $16,173.09, and on freight-cars, $283,825.02, and this in a year in which not a single serious accident occurred, and not one human being had been injured. The company has constructed and put upon the road eight drovers' palace cars, one of which is attached to all cattle trains for the accommodation of the drovers. These are very elegantly provided with tables and well-cushioned seats, and can be used as sleeping-cars. Mr. Reniff, the superintendent, has had eleven years' experience in his place, and is constantly busy in improving the rolling-stock of the company. The Pullman cars that run on this road undergo their repairs at Bloomington, at the expense of the Chicago and Alton Company.

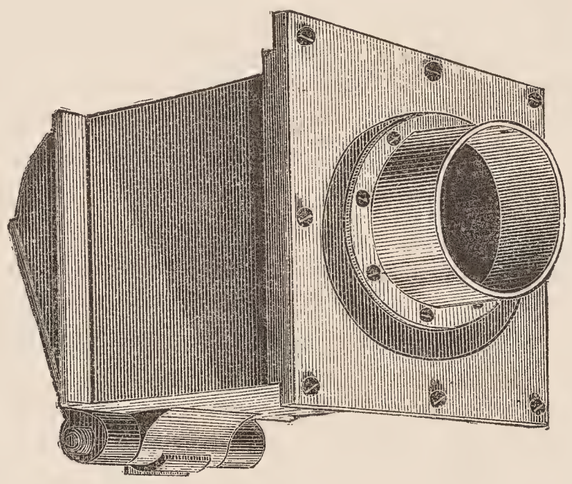
The machine-shops are divided in the different branches as follows: The boiler-shop, 80 feet long by 50 feet wide; foreman, Mr. G. E. Eastman. The machine-shop, 230 feet long by 145 feet wide, with a wing 80 feet long by 45 feet wide attached, and six stalls of the old round-house, used for an erecting-shop; foreman, Mr. H. S. Smith. The blacksmith-shop, 200 feet long, 100 feet wide, containing fifty-two forges, to which wind is supplied through an underground pipe; foreman, Mr. William Hughes. The foundry, 180 feet long, 60 feet wide, with cleaning room, 50 feet square, attached; foreman, Mr. A. Moulton. Two round-houses, 240 feet in diameter, and twenty-eight stalls in each; Mr. A. A. Ackerly in charge. There is also a brass foundry and an oil-room, the latter having nine immense tanks underground, capable of holding thousands of gallons of oil. In this immense establishment not alone the locomotives are made and repaired, but all iron-work for the entire road is manufactured, besides all the tools wherewith the work is carried on. Connected with both the car-works and machine-shops is a store-room, in charge of Mr. Bell, where upward of half a million of stock is constantly kept on hand.

The Chicago and Alton Railroad owns fifty-two passenger-cars, whose value is nearly $200,000; fourteen baggage-cars, worth $1000 apiece; eight express cars, worth together $5000; of flat, stock, and box-cars, the company owns 2359, representing a capital of nearly $1,000,000, and two wrecking-cars, which cost about $4000 apiece. All these are provided with the "Creamer brake;" but it is the intention of the company to substitute this shortly by a patent steam-brake. The company own 131 locomotives, worth $10,000 apiece. Fifteen of these engines were purchased from the Schenectady Locomotive Works, and the rest, with the exception of the tires and boiler-plates, were made at Bloomington.

Smith's Railway Journal Dust-Excluder.

AMONG the many inconveniences attending the practical operation of railroads, there is none for which an effectual remedy is more desirable than the working of dust into journal-boxes and the injury re-

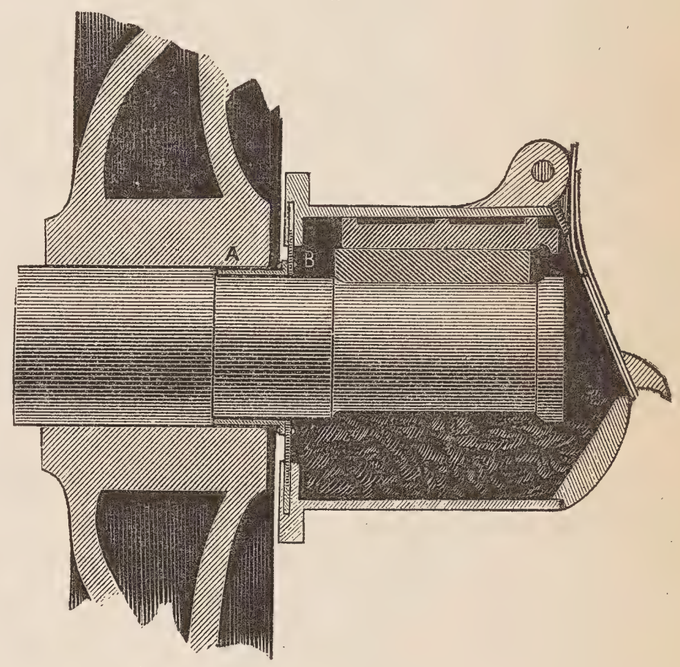
Fig. 1.



sulting therefrom to the journal. A device that will protect the axle between the wheel-hub and journal-box, so as to exclude the dust, and at the same time prevent the leakage and waste of oil, has at length been discovered, and its practical utility tested in a satisfactory manner. The invention consists of an improved attachment to the journal-box, in the form of a brass sleeve fitting snugly to the axle, one end of the sleeve extending about three quarters of an inch within the hub of the wheel, the axle being turned down just enough to admit it. The outer end of the sleeve is riveted by a flange to a thin metal plate, with an opening in it corresponding to the inside diameter of the sleeve, the plate being kept in place in the end of the journal-box, so as to have a limited sliding movement, which permits free motion of the axle—vertical, lateral, and sideways; while all external communication with the inside of the journal-box, on the end toward the hub, is entirely cut off, the dust being thereby effectually excluded, and no waste of oil takes place.

The nature of the device is illustrated in the engravings. Fig. 1 represents an end view of the journal-box facing the wheel, with the sleeve attached to the metal plate. Fig. 2 represents the sleeve fitted to the axle and extending into the wheel-hub at A, completely protecting the axle.

Fig. 2.



The extra cost of this arrangement over the old plan is about $1.50 per box; but the advantage resulting from its use greatly exceeds in importance the additional expense.

By way of experimental test, two of these boxes were placed under one of the Erie Railway twenty-seven ton sleeping-coaches, and run 58,000 miles, and neither the axles nor journals show the least perceptible wear. The exclusion of the dust was complete.

Further information may be obtained by addressing Vose, Dinsmore & Co., No. 1 Barclay Street, New-York. Application for a patent has been made by the inventor, Mr. C. A. Smith, of Jersey City.

Narrow-Gauge Convention.

A CONVENTION of managers of narrow-gauge railroad companies, and of manufacturers of narrow-gauge rolling-stock, was held in St. Louis, June 19th and 20th. The following is an official list of the topics which were under consideration:

1. The want of railway facilities.
2. The comparative costs of the two systems.
3. Our means of constructing the broad gauge as compared with the narrow gauge.
4. The comparative cost of operating the two gauges.
5. Can narrow-gauge locomotives be constructed of sufficient power and speed to answer general requirements.
6. Can the passenger-coaches be made safe, comfortable, and popular with the traveling public?
7. Can freight-cars be constructed of convenient size for the transportation of cotton, live stock, and general freights?
8. What saving in dead-weight will the narrow gauge effect?
9. How will the saving in first cost and dead-weight affect the rates of freight and passage?
10. Break of gauge or connections.
11. Experience and opinions of experts.
12. The narrow gauge as compared with the broad gauge as the means of development.

GEORGE H. NETTLETON, formerly superintendent of the Hannibal and St. Joseph Railroad, retired from that position on the 1st of July, and has accepted the position of general manager of the Atchison, Topeka, and Santa Fé Railroad. The vacancy made by the retirement of Mr. Nettleton from the first-named road, has been filled by the appointment of O. S. Lyford, heretofore superintendent of the Buffalo division of the Erie Railway.

The National Car-Builder,

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BY

VOSE, DINSMORE & CO.,

1 Barclay Street, New-York; 238 Michigan Avenue, Chicago; 713 North Second Street, St. Louis.

Terms, 50 cents per Annum.

Editorial Announcements.

Correspondence.—*We cordially invite the coöperation of the railroad public in affording us the material for a good mechanical paper. Articles relating to rolling stock and machinery, by those practically acquainted with those subjects, will be gratefully received. All communications must be addressed to Vose, Dinsmore & Co., No.* 1 *Barclay Street.*

The name and address of the writer must accompany all communications designed for publication.

Advertising Rates.—*For one square, or one fifth of a column,* $5 *per month, or* $50 *a year. For half a square,* $3 *per month, or* $25 *a year. Larger advertisements by special contract.*

All communications in regard to advertising should be addressed to L. F. Dinsmore, *Post-Office Box* 4055, *New-York City, who is our agent for advertising, and authorized to make contracts, collections, etc.*

Engravings and Illustrations.

We would invite the attention of Master Car-Builders and others to the advantages to be derived from publishing in The National Car-Builder *engravings designed to illustrate the various features and details of car construction, and especially such improvements as can not otherwise be clearly presented. We will procure cuts to be made in the best manner from drawings or models that may be sent us, and charge only for the cost of engraving, inserting the same in our paper with suitable descriptive details, without charge.*

Our Advertising Patrons.

Only a few months ago, we were compelled to add four pages to our paper to make room for the increasing favors of advertisers and prevent encroachment upon the space allotted to general reading matter. This addition has, however, proved inadequate to meet the demand upon this department, and we are again obliged to make another permanent enlargement, beginning with our present number, which contains four additional pages, making twenty in all, exclusive of cover. This substantial evidence of the value of The Car-Builder as an advertising medium is no less gratifying than significant. We have hitherto made no special effort, either by personal canvassing or editorial solicitation, to secure the favors of this class of customers, preferring that those who use our columns for advertising purposes should judge for themselves as to whether the investment is a paying one. We can not refrain, however, from mentioning the fact that many individual advertisers have from time to time assured us that large and desirable sales have directly resulted from making their business known to railway managers and operators through our columns. This could hardly have been otherwise, when it is considered that The Car-Builder goes into the hands of master-mechanics, master car-builders, superintendents, and purchasing agents, besides a large number of miscellaneous readers connected in one way or another with railroads. Its form, typography, and general appearance also favor the advertiser. Every one knows that a well-printed paper, with clear type, attractive illustrations, and tasteful make-up, is less likely to be neglected or laid aside with a mere casual glance at its contents. We say then to our advertising friends, Send us your favors, and we will do our part to give you an equivalent for your money. The Car-Builder is capable of indefinite enlargement, and it will keep on growing so long as it can be made instrumental in promoting the interests of its patrons.

Important Invention.

In the present number of our paper we give a somewhat minute description, with accompanying illustrations, of a machine recently invented by Mr. H. R. Leonard, of Oregon, for the purpose of adjusting or applying an equal tension on rods or bolts used in bridges and other suspension structures.

The past thirty years have witnessed a prodigious advance in the application of machinery for all purposes. Among the great number of inventions that have come into use within that time, are included various devices for testing the strength of iron rods, bolts, and other materials; but the machine here referred to is, we are informed, the first ever invented for the purpose of *applying* the strain on rods or bolts to any extent that may be desired. In the adjustment of bridges and other similar structures where a number of supporting rods are used, it is essential to obtain an equal tension on all these rods, in order to secure a uniform strength to the whole. In the case of railway bridges, the unequal strain on the supporting rods is doubtless the cause, in a majority of instances, of the structure giving way under the pressure of a heavy train.

By the use of this device, an equal strain is not only obtained, but the proper amount of tension is applied to the rod, so that it may not carry more weight than it was designed to carry. The details as given elsewhere will be obvious to every mechanic or engineer. The general construction and design of the tool are well calculated to render it reliable and effective, and bring it into general use.

Railway Car-Springs.

Of the many details essential to the construction of railway rolling-stock, and especially for freight and passenger-car trucks, there are none more important than springs. The durability of the car-body, the ease and comfort of passengers, as well as the safe and satisfactory transportation of freight, are all dependent to a greater degree than any one would suppose, who does not carefully investigate the matter, upon the kind and quality of buffer and bearing springs interposed in one way or another to break the force of concussion and save the frame-work of the vehicle from dislocation. The prodigious wear and tear incident to the movement of heavy trains at high rates of speed, and the necessity of counteracting the effect and reducing the cost of repairs resulting therefrom as far as possible, have taxed the resources of mechanics to the utmost. Long experience and careful observation have enabled car-builders to test the merits of the various kinds of springs, by determining the particular kind best adapted to particular purposes, as well as the best methods of applying them, so that each spring shall do its proper work to the best possible advantage, without any waste of power or misapplication of its special qualities.

The two materials of steel and rubber, either separately or in combination, are found to make the best springs for resisting prolonged and heavy strains and supporting great weight; and the skill and rivalry of inventors and manufacturers in experimenting, tempering, testing, and applying these materials to the purpose required, have largely contributed to the effective working of our railway system as it is to-day. Steel is capable of being wrought into an infinite variety of combinations and forms; and doubtless there is some specific combination and form in which its peculiar properties are the most completely available as a spring adapted to sustain a certain pressure and strain. Whether this goal has been reached in the manipulation of this material may not be altogether certain; but a near approximation has doubtless been attained. The same may also be said of rubber, as well as of a combination of the two in the form of a spring for freight purposes, in which each, as it were, complements the other, and the inherent strength and elasticity of both are rendered in the highest degree effective.

In this connection we would refer our readers to our advertising columns for illustrations of some of the more important railway car-springs manufactured by Messrs. Vose, Dinsmore & Co. Their experience in this special branch of car equipment, and intimate knowledge of what is required for every kind of service, enables them to supply car-builders with the best and most approved springs offered in the market. They adhere to one established standard quality that is adequate to the service required, well knowing that a deviation from this rule for the purpose of cheapening the first cost of a car is poor economy, and in the long run, recoils with damaging effect upon all concerned.

Master-Mechanics' Convention.

The official report of the doings of this association at its recent meeting in Boston, is in course of publication in the *Railroad Gazette*, and will occupy altogether about thirty pages of that paper in small type. The report is very elaborate and interesting. The discussions are given verbatim, in connection with the reports of the various committees, communications, and other matter forming a legitimate part of the proceedings. The report is, to all appearances, a literal and faithful daguerreotype of what was said and done. To give any considerable portion of this mass of matter in our columns, would of course be impossible, but we hope to find room in our future issues for such extracts as we may deem interesting to our readers.

The Rubber Centre Spiral Spring, manufactured by Messrs. Vose, Dinsmore & Co., is protected by letters-patent, and all springs of this kind manufactured by other parties are infringements. The purchasers and users, as well as manufacturers of the article, should take due notice.

The extensive repair and construction shops of the Erie Railway, at Jersey City, were destroyed by fire on the evening of the 24th ult., involving a heavy loss in machinery, rolling-stock, and material. It is estimated that the loss will not exceed $400,000, a large portion of which is covered by insurance. Twenty-four locomotives were destroyed, a number of which were new ones.

The blacksmith and carpenter's shops of Messrs. W. C. Allison & Son's car-works, in West-Philadelphia, were burned on the morning of the 25th ult. The loss is estimated at $200,000, and is fully covered by insurance.

The attention of car-builders is invited to the advertisement of Messrs. Willard Hawes & Co., on page 20, dealers in fancy woods. They have some beautiful specimens of satin-wood imported from St. Domingo, which is being used on the new Pacific Mail steamers now building. We would also call attention to the advertisement of Mr. L. Hirsch, on fourth page of cover, dealer in fancy woods, and who makes a specialty of French walnut.

A Boston mechanic recommends the placing of electro-magnets in shops where iron and steel-dust prevail, to take up the particles and prevent them from pervading the atmosphere and injuring the health, which would undoubtedly prove effectual. It has been the practice for a long while to use the magnet to draw small pieces of iron and steel from the eye; and this process has been effectual when all other means have failed.

New Publications.

THE CABINET-MAKER.--This valuable and ably conducted weekly trade-journal has just entered upon its third year, and has attained a measure of success as gratifying as it is well deserved. It is specially devoted to the interests of that branch of mechanical industry indicated by its name, and always contains a large quantity of information of value to the trade, embracing woods, machinery, styles of furniture, and hints and suggestions for manufacturers and dealers. It is published in Boston, and is among the most welcome of our exchanges.

HANDICRAFT.—A monthly journal devoted to progress in the industrial arts is published by the Handicraft Publication Company, 37 Park Row. The June number contains a variety of articles of practical value to farmers, mechanics, manufacturers, and others, written in a style well adapted to popular appreciation.

THE TRAVELER'S OFFICIAL RAILWAY GUIDE, after a short suspension, in consequence of the recent destruction of its office and materials by fire, has again made its appearance, and contains, with few exceptions, its usual variety of interesting and valuable railway information. It had already won such a wide reputation as a reliable and comprehensive guide for the traveling public, that its suspended publication for a brief period only was a loss universally felt. The promptitude and energy displayed in its speedy reissue, the correctness of its time-tables, the *personnel* of the various roads, and the variety of incidental matter, requiring so much time and labor to compile and arrange, are deserving of cordial recognition and liberal support.

POOR'S RAILROAD MANUAL for 1872–3 is just out. It contains nearly 700 pages, and comprises a mass of information, statistical and otherwise, of the greatest value to those interested in the condition and progress of our railway system. The index contains the names of 1493 roads. The aggregate mileage at the close of 1871 is estimated at 60,852 for the United States, the increase during the same year being 7222 miles. The financial condition of roads, amount of rolling-stock, passenger and freight traffic, cost of construction and equipment, gross and net earnings, dividends, etc., are all given with as near an approach to accuracy as the nature of the case and laborious and painstaking research will permit. The *Manual* has become a recognized standard of information, and a reliable index of the growth of railroads, of such value that no railroad officer, or dealer in railroad supplies or securities, can afford to be without it.

CROFUTT'S TRANS-CONTINENTAL TOURIST'S GUIDE.—We have received the fourth volume, being the third annual revise, of this admirable guide-book for the Union and Central Pacific railroads with their several branches and connections. It contains a great number of maps and illustrations, with full and authentic descriptions of towns, villages, stations, lakes, rivers, mountains, springs, and innumerable objects of interest along the line of the great thoroughfare from Omaha to San Francisco. For tourists and others who have occasion to make a trip across the continent, it is indispensable. Price, $1 and $1.25, according to style of binding. Address George A. Crofutt, 138 Nassau street, or Post-office box 3435.

THE AMERICAN ARTISAN.—This excellent journal has recently been very much enlarged and improved. In the variety of its contents, clear and faultless typography, and beautiful illustrations, it is not surpassed by any other weekly journal of its class. Its editorial department is now under the supervision of Mr. Liecester Allen, heretofore associate editor of the *Scientific American*, who succeeds the former editor, Mr. J. W. Coombs. As an organ devoted to the development and progress of the mechanical arts, it is indispensable to the artisan, manufacturer, and builder, and should receive the encouragement and support due to well-directed enterprise.

PATENT CAR AND SWITCH LOCK.—We beg to call the attention of purchasing agents and others to the advertisement on third page, of Messrs. Edward Lambert & Co., sole agents in the United States for the sale of Bohannan's patent brass car and switch lock, which has been introduced on several leading lines of road. Its workmanship is tasteful and elegant, and its action all that can be desired. We think no road will regret giving it a trial. Orders should be addressed to the agents as above, 52 Wall street.

BLAKE'S PATENT STEAM PUMP.—The important features of this machine may be briefly stated as follows: The material and workmanship are of the best quality; it is positive under any pressure; will run at any speed, slow or fast; and will discharge more water than any other pump of the same dimension. The steam part is cast in one piece, which obviates leaky joints; the steam valve is perfectly balanced, will start at any point of stroke, discharge the condensed water, and pump any kind of thick or thin fluid, hot or cold, the valves being suitably arranged for the purpose. The hot-water piston is a recent invention, and is adjustable to any pressure without the use of checknuts or wrenches, is perfectly elastic, compensates for wear, and is always tight. The working parts can be duplicated in case of accident, and every pump is warranted. See advertisement on second page.

Miscellaneous Items.

AT a meeting of the stockholders of the Erie Railway, held on the 9th ult., Peter H. Watson was elected president, and A. S. Diven vice-president for the ensuing year. Mr. Watson was assistant Secretary of War during the administration of Mr. Lincoln, and has for some time past resided in Ohio. He has had much experience in the management of railroads, and will no doubt fill the responsible position to which he has been chosen in a manner satisfactory to the stockholders and the public.

THE car-works of W. J. Quealy, at Hannibal, Missouri, which were seriously damaged by fire several weeks ago, have been repaired, and are now turning out from six to eight freight-cars per day. Temporary buildings have been erected as shops for the time being, which will be superseded by permanent ones at no distant day.

FIFTEEN elegant new passenger-coaches have just been put upon the Cleveland, Columbus, Cincinnati, and Indianapolis Railroad, to run between Cleveland and Cincinnati, over the new short line route. Eight of them were built at the Cleveland shops under the superintendence of Mr. William F. Smith. They are models of neatness, beauty, and elegance, having every modern convenience for the comfort of travelers. The other seven were built at Dayton. All are supplied with Miller platforms and air-brakes.

THE following are the dimensions of the great bridge now being erected between New-York and Brooklyn: Total length, 5862 feet; length of central span, 1600 feet; elevation above high-water, 130 feet; width of bridge floor, 80 feet; height of towers above high-water, 268 feet; base of towers at water line, 134x56 feet.

THE Washburn Works, Worcester, Mass., are to have car-wheel works in Hartford, Ct. Ground was broken for them lately on Suffield street, near the track of the Hartford and New-Haven Railroad.

THE whole of the capital stock of the Grand Rapids Car Company, at Grand Rapids, Michigan, has been taken, amounting in all to $300,000.

THE Atlantic and Great Western Railroad Company is about to erect new shops at Galion, Ohio. They are to be of the following dimensions: Main shop, 211 by 100 feet; blacksmith-shop, 188 by 65 feet; boiler-shop, 96 by 65 feet; and will employ from 250 to 300 hands. The shops are to be of stone and brick, and roofed with slate. They also expect to build extensive shops for repairing freight and passenger-cars.

A CERTIFICATE of incorporation for a new stock-car company at Columbus, Ohio, has been filed in the office of secretary of State. The capital is $1,000,000, and the corporators are: John L. Gill, R. E. Neil, F. C. Sessions, P. Hayden, and John G. Deshler.

A NEW drawing-room car on the Vandalia line has a cabinet-organ and a handsome writing-desk for the accommodation of passengers.

THE Mansfield, Ohio, Machine-Works are making a new hoisting-engine which is claimed to be superior to any now in use. They are also manufacturing freight-cars and stationary and portable engines, employing 180 men.

JOHN L. GILL, Columbus, Ohio, employs 300 men, using about 5000 tons of cold-blast iron, 2000 tons hot-blast iron, and 1800 tons wrought-iron per annum, nearly all of which is used in the manufacture of railroad-cars and car-wheels.

THE Baltimore and Ohio Railroad Company are building a new round-house at Newark, O., which is to contain 40 stalls; also one of the largest car-shops in the West at the same place.

THE Canada Car Company has recently been organized at Toronto, with a capital of $500,000, for the purpose of manufacturing passenger and freight-cars. As a large number of cars are annually built in the United States for Canada roads, and as material and labor are supposed to be cheaper there than here, it is thought that such works in the Dominion can not fail to thrive.

THE Pullman Palace-Car Company has recently opened an office at 287 Broadway, New-York, so elegant and tasteful in its fitting-up as to rival some of its most luxurious coaches. It is in charge of Mr. George M. Gray, a well-known Chicago railroad man, who is the general agent of the company in this city.

THE Lehigh Car Manufacturing Company at Stemton, Northampton County, Pa., have a capital of upward of $100,000, and employ 160 men. The works cover ten acres, and consist of 1 main shop, 60x310 feet; 1 blacksmith's-shop, 62x70 feet, containing 26 forges, and 1 repair-shop, 30x100 feet, with a 50 horse-power steam-engine. About 3500 cars are turned out annually, constructed of the best material. George H. Stem is the superintendent.

AT the Grand Central depot in New-York is a steam railway-car, seventy feet wide, which travels on a track of corresponding width. This great vehicle is made in the form of a low platform-car, and the track on which it runs is provided with four rails extending from Fourth avenue to Madison avenue. The car is used for the lateral transfer of passenger-cars from the main tracks of the Hudson River, Harlem, and New-Haven railways to the various side tracks, thus avoiding the use of turn-tables. The car is propelled by steam, the engine and boiler being contained within a sheet-iron house, carried on one side of the machine.

THE Detroit Car and Manufacturing Company are engaged in building a number of steel freight-cars upon a plan invented by Dr. Lamothe, of New-York. The body of the car consists of a frame-work of steel rods bent to the required shape, crossing each other in sections of four and secured by belts and steel-traps. Over this frame-work is a double covering of wood and sheet-iron, and it is claimed that cars built on this plan are both lighter and stronger than any others.

A CLEVELAND inventor has just brought out an automaton side-door car, to afford a means of escape to passengers in case of accidents which throw the car from the track and overturn it. The arrangement is such that when the car veers over and becomes supported only by the wheels of one side, the opposite side of the car opens promptly, thus allowing escape from the disaster.

ONE of the most valuable achievements of the new Chicago is that of comfortable street-cars. They are open and airy, and furnished with double cane-seated chairs, where every body knows how much space he is entitled to. A very small fire in some other cities would possibly be not amiss, if it were certain that a similar improvement would follow.

THE Pennsylvania Railroad Company have, it is said, inaugurated a new system of passes. The legislative or citizen dead-head must, on application for a pass, sit for his photograph, which is then mucilaged upon the pass, thus preventing a whole township from enjoying its privileges.

TOM SCOTT has invested $150,000 in saw-mills, at Apalachicola, Florida, to get out cross-ties from cypress and juniper, which will be chemicalized in some way to be rendered fire-proof, and used on the Southern Pacific Railroad.

STREET railroads are to be laid in Paris. Thirteen have been projected, and four are to be commenced immediately. First and second-class cars will be run, the fares being charged according to distance, at the rate of three cents per mile for the first-class and two cents per mile for the second.

A NARROW-GAUGE parlor-car for the Denver and Rio Grande Railroad, passed through St. Louis a short time since. It was a model of beauty, and was provided with easy-chairs similar to barber's chairs, and intended for use either night or day.

THE Baltimore and Ohio Railroad Company propose the erection of another iron mill at Cumberland, to furnish themselves with supplies of small railroad iron fixtures.

THE Connellsville Railroad has opened a good timber region, especially of oak for car-builders; but the rapidity with which it is being cut away leads to the belief that ten years will exhaust it.

THE Great Northern Railway Company is now running a fast train between London and Edinburgh, 395 miles, in 9½ hours, which is at the rate of about 42 miles an hour.

THE car-shops of the Pennsylvania Railroad Company at Altoona give constant employment to upward of 2550 men.

DURING the present year the probable increase of equipment of the Baltimore and Ohio Railroad will be 40 locomotives and 2000 cars, and the monthly disbursements of labor, materials, etc., amount to $750,000.

THE Tredegar Company, at Richmond, Va., advertise for material for the construction of a mammoth addition to their present railroad car construction-shop. This company now employs 1300 hands, and they could employ one third more if their facilities would admit.

THE condition of the rolling stock of the Mobile and Ohio Railroad has been improved during the year. The locomotives are generally in better order than at any time since the war. One hundred and eleven new freight-cars, four six-wheeled passenger, two express, and one baggage-car have been added to the stock during the year. All of these, except the bodies of two passenger-cars purchased in Cleveland, were constructed at the Whistler and Jackson shops. There is on hand the iron-work, except wheels and axles, for ninety freight-cars and one baggage; and two express-cars are approaching completion. The opinion before expressed as to the superior character of the plans and workmanship of the cars, both freight and passenger, constructed in the company's shops, has been fully confirmed by the experience of the past year.

THE Higley Car-Journal Company, of Cleveland, has filed the certificate of corporation in the office of the Secretary of State, at Columbus, Ohio. The company is organized for the manufacture of railroad and street-cars, railroad car-journal bearings, car-brakes, car-trucks, etc. The capital stock is $200,000, in shares of $100. The corporators are Aaron Higley, Christopher Sawyer, Thomas H. White, W. H. Truscott, and G. I. Stanhope.

THE Cleveland Bridge and Car Works—the McNairy & Claflen Manufacturing Company, proprietors—have contracted to bridge the Detroit River from Stony Island to the American shore, crossing Gross Isle and the American Channel. The bridge will be 2500 feet long, with a draw of 300 feet. The work is to be done for the Canada Southern Railroad Company.

MR. B. F. TIFFANY, Superintendent of the Pullman Palace Car Works in Detroit, has received a present of a silver tea-set from the employees of the works. He is to remove to Chicago to take charge of the Pullman shops there when they are completed.

OMAHA has just manufactured a complete train of cars for the Union Pacific road.

The Engine Song.

WITH a clang!
With a clank and clang!
With a clamor, and a clank, and a clang!
With clatter and clamor, a clank and a clang!
With veins full of fire, and the artery steam
Roused to the pulse of a feverish dream;
With a gray plume trailing, fleecy and pale,
Like mist-boats sailing to sea with the gale;
With the ring and the rattle of lever and wheel,
And the blow and the battle of track and of steel;
With a tremulous spring, like the launch of a wing
From the condor's cliff, where the wild vines cling,
An eagle of iron, with sinews of steel,
And blow of a pinion like avalanche peal;
With talons of flame, and a blaze in the blood,
I tunnel the mountain and compass the flood;
I startle the morning and shiver the noon,
And splinter the cold, pale rays of the moon;
From pine and from granite to orange and palm,
From storms of sleet fury to zephyrs of balm;
From Alleghan summit to Michigan wave,
From the life of the East to the pioneer's grave,
Dragging a train,
As a flying prisoner drags his chain;
Climbing the grade,
Panting and sullen, but undismayed.
Then away to the prairie, with antelope speed,
Belting the forest and skimming the mead,
Awaking the bear from his underground lair,
And startling the deer to a leap in the air;
Breaking the Indian's solitude rest,
Pushing the buffalo far to the west;
Skirting the current with spur and with thong,
Where the drain of the continent thunders along,
Mixing and mingling the races of men,
Bearing the New in advance of the Then!

Then ceasing the rattle of lever and wheel,
And parting the battle of track and of steel,
And ending at last the roll and the race,
And checking the flight into gradual pace—
With clatter and clamor, a clank and a clang;
With a clamor, and a clank and a clang;
With a clank and a clang;
With a clang!

Estimating the Speed of Trains.

SEVERAL devices have been contrived to register the speed of trains, but none of sufficient simplicity to come into general use have yet been suggested. Messrs. Samman & Von Weber's construction, a German invention, consists of a disk driven by clock-work and a recording pencil. While the train is halting, this describes a circle; but during the journey a crooked line is produced by the vibration. In M. Cremer's apparatus, a strip of paper moves by clock-work. This paper is graduated and marked in minutes. A needle, with an up-and-down motion, which is in connection with an axle, pricks the paper. The distance of the holes serves as a guide in calculating the speed. On French railways, a contrivance is met with, in principle not unlike the centrifugal governor, the coupling-box of which is in connection with and moves a pencil. In Shiff's apparatus, which is not unlike that of Cremer, the needle is moved by a battery, which renders its working more complicated and uncertain.—*Franklin Inst. Jour.*

Designs for Locomotives.

THE system adopted in England for procuring locomotives is for a specification to be drawn up by the locomotive superintendent of the railway, describing with the utmost minuteness the dimensions of all the parts, quality of material, and mode of construction. This specification is submitted to parties tendering, and the completion is restricted to the price per pound. The American system is to specify only the requirements of the locomotive, and introduce completion into the design as well as into the manufacture. The advantage of this system is that the railway company, instead of being confined to that quality of engine which the skill of their own officers can produce, are enabled to avail themselves of the best constructive talent in the whole country, sharpened and developed to the utmost by competition.

Personal

MR. I. C. BUCKHOUT, long Chief-Engineer and General Superintendent of the New-York and Harlem Railroad, is relieved of the duties of Superintendent, and hereafter will be Chief-Engineer only. The work of improving the Fourth avenue entrance, involving, as it does, an immense amount of engineering work, is likely to give the company's engineer full employment for some time to come.

A. C. ROBSON, who has been in the employ of the Lake Shore Railroad Company, in Buffalo, for over eighteen years, has been promoted to the superintendency of the car-shops and car-repairs on the Buffalo division, in place of Mr. Sutherland, who goes to Detroit to take charge of the new car-works at that place.

CHARLES W. MEAD, formerly general superintendent of the Hannibal and St. Joseph Railroad, afterward assistant general superintendent of the Union Pacific, and at present president of the Omaha Smelting Works, has been appointed general superintendent of the Northern Pacific Railroad.

J. W. PHILBRICK has been appointed general master-mechanic on the Maine Central Railroad, with superintendence of all the shops of the company. John F. Merrill takes Mr. Philbrick's place in the Waterville shop.

MR. B. L. BOULINEAU has resigned his position as master-mechanic of the Central Railroad of Georgia. He has been connected with the road for a number of years.

Facetiæ.

A GENTLEMANLY conductor was collecting tickets from his passengers. All handed over their tickets promptly except one fat old lady who sat next to the door, and who seemed to be reaching down to get something she had dropped on the floor. When her time to pay came, she raised her head, and, addressing the conductor, said, "I allurs, when I travels, carry my money in my stockin'; for you sees, nothin' can get at it thar; and I'd just thank you, young man, to reach it for me, as I'm so jammed in that I can't get to it. I forgot to get a ticket at the depot." The conductor glanced at the other passengers, some of whom were laughing at his plight, one or two young ladies among them blushed scarlet, and he beat a sudden retreat, muttering something about not charging old ladies, etc. His cash was short that trip the fare of one passenger.

LEONARD, of the Cleveland *Leader*, has invented a sheet-iron cat, with cylindrical attachment and steel claws and teeth. It is worked by clockwork. A bellows inside swells up the tail at will to a belligerent size, and, by a *tremolo* attachment, causes, at the same time, the patent cat to emit all noises of which the living bird is capable. When you want fun, you wind up your cat and place him on the roof. Every cat within half a mile hears him, girds on his armor and sallies forth. Frequently fifty or one hundred attack him at once. No sooner does the patent cat feel the weight of an assailant than his teeth and claws work with lightning rapidity. Adversaries within six feet of him are torn to shreds. Fresh battalions come on to meet a similar fate, and in an hour several bushels of hair, toe-nails, and fiddle-strings alone remain.

A CORRESPONDENT writes an account of a new iron safe, which was exposed to a heat that completely destroyed its competitor, and from which were taken, after the trial, a live rooster and a lump of stamped butter. The butter was harder than when it was put in, the stamp remaining perfect, and the rooster came out alive and well, only suffering from the cold, and almost frozen by the low temperature to which he had been exposed.

A MAN who had been punishing his wife, and after shutting her up in a room, sent his little boy up-stairs with the command, "Tell your mother here is a bone your father sent up for her to pick," to which she replied, "Take it back and tell him he isn't your father, and that's a bone for him to pick."

A MAN was choked to death in New-York the other day while trying to swallow a piece of Bologna sausauge. So they say; but the probability is, that he was choked by some foreign substance. The makers of the Bologna sausage can't be too particular, while chopping up the meat, in removing the collar of the dog.

"YOUNG man, do you ever drink?" asked a mild-looking man, accosting Jones. "Well, yes, thank you; as it's a cold morning, I don't mind," replied Jones, removing his quid of tobacco. "Don't do it any more," rejoined the mild man, "or you will eventually be damned. Good morning. God bless you!"

THE only amusement of the citizens of Calhoun, Ga., is that of tying tinware to the tails of the village dogs. The dogs are so well trained that, whenever one of them sees an oyster-can in the street, he backs up and waits for some one to tie it on.

A CITIZEN of Gosport, the other night, mistook his wife's yeast-bottle for his favorite "little brown jug," and took "a long pull and a strong pull" therefrom. He is now regarded as a rising man.

THE newest Yankee notion is a new stove for the comfort of railway travelers; it is to be put under the feet, with a mustard plaster on the head, which draws the heat through the whole body.

A BABY lately had the misfortune to swallow the contents of an ink-bottle. Its mother, with wonderful presence of mind, immediately administered a box of steel pens and two sheets of foolscap paper, and the child has felt *write* inside ever since.

A COUNTRYMAN in Savannah observed a gang of negroes at work in the streets, each wearing a ball and chain. He asked one why that ball was chained to his leg. "To keep people from stealing it," said the darkey; "heap of thieves about here."

THEY have a rather singular railroad in East-Tennessee. A newspaper at Jonesboro speaks of that place as its "termini." It is not one time in a thousand that you find a railroad with both ends sticking into the same town.

THE best Dollv Varden story yet, is told of a young lady of Little Rock, Arkansas, who had a very small kitten she named Dolly Varden, but as it progressed in age and other developments she discovered it was not that kind of a cat, so she rechristened it Thomas Varden.

AN Iowa man recently died from swallowing a pocket-knife and injurious medical treatment combined. He got along very nicely as long as the knife was closed; but when the doctor gave him opening medicine, it killed him.

A CANDY boy, passing through a car, met a cross old gentleman, and says, "Pop-corn! pop-corn!"

"Hain't got any teeth," angrily replied the man.

"Gum-drops! gum-drops!" calls the smart boy.

AN Idaho invalid was ordered by a physician to take three ounces of brandy a day, and knowing that sixteen drachms make an ounce, has patiently been taking forty-eight drinks a day ever since.

IN Cincinnati, almost every portion of the hog is put to some use. A distinguished philosopher of that city is now trying some method of turning the squeal to account.

ONE of the boys tells of a scarecrow made by Uncle Ben. It not only scared off every crow that saw it, but one crow was so frightened that he brought back the corn he had stolen three days before.

AN Illinois editor has become so hollow from depending upon the printing business alone for bread, that he proposes to sell himself for stove-pipe at three cents a foot.

A MOST excellent old lady is much exercised in mind to know how it is a little quicksilver in a glass tube can make such hot weather by just raising an inch or two.

THE inventor of a watch that winds itself up and gives a pint of milk a day has arrived in Washington to secure a patent.

IT is said that the New Jersey watering-places are rapidly filling up with mosquitoes, and never before were they so thoroughly organized and confident of success.

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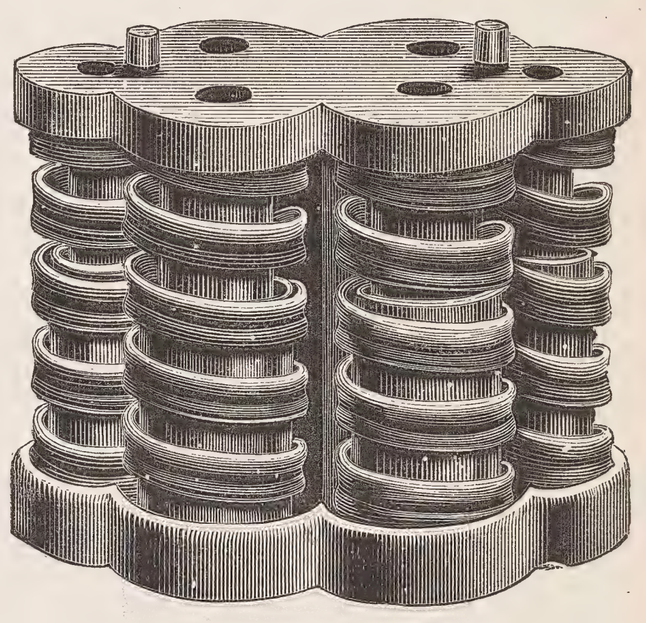

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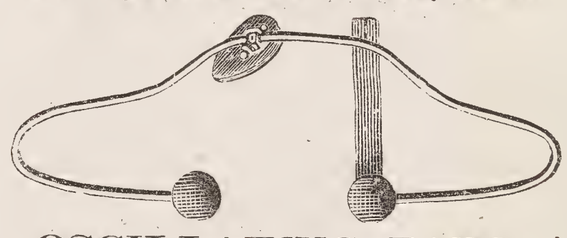

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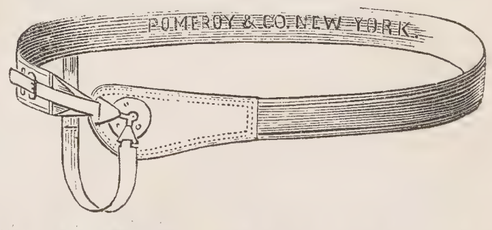

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Atlantic & Great Western	N. Wright		Cleveland, Ohio.
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Bellefonte & Snow Shoe	H. D. Landis	H. D. Landis	Bellefonte, Pa.
Belvidere Delaware	R. McDowell	John Silvers	Lambertville, N. J.
Boston & Albany	Wilson Eddy	F. D. Adams	Springfield, Mass.
Boston & Albany	A. B. Underhill	W. E. Chamberlain	Boston, Mass.
Boston & Providence	George Richards	John Lightner	Roxbury, Mass.
Boston, Clinton & Fitchburg	John Webster	Samuel Stevens	Fitchburg, Mass.
Boston, Concord & Montreal	R. Adams	M. R. Elkins	Lake Village, N. H.
Boston & Maine	F. A. Waitt		Boston, Mass.
Boston & Maine		D. C. Richardson	Lawrence, Mass.
Boston, Lowell & Nashua	L. R. Winslow		Boston, Mass.
Boston, Lowell & Nashua		S. A. Davis	Nashua, N. H.
Blossburg & Corning	O. C. Patchell	O. C. Patchell	Corning, N. Y.
Brockville & Ottawa	Joseph Cockfield	Joseph Cockfield	Brockville, Can.
Blue Ridge			Anderson, S. C.
Burlington & Missouri River	G. Chalender	G. Chalender	Burlington, Iowa.
Burlington & Missouri River	J. Christiansen		Plattsmouth, Neb.
Burlington, Cedar Rapids & Minn	J. P. Messer		Cedar Rapids, Iowa.
Buffalo & Washington			Buffalo, N. Y.
Boston, Hartford & Erie	Geo. E. Boyden	Elias E. Pratt	Boston, Mass.
Buffalo, Corry & Pittsburg	Thomas Connell	Thomas Connell	Corry, Pa.
Buff. Bayou, Brazos, Colorado		M. Borst	Harrisburg, Tex.

C

California & Pacific	O. R. Ford	D. Rutherford	Vallejo, Cal.
Camden & Amboy	F. B. Stevens		Hoboken.
	T. T. Kerr	E. Lockwood	Bordentown, N. J.
	Thomas Single		South-Amboy.
Camden & Atlantic	E. Collings	S. Wills	Camden, N. J.
Catawissa	A. J. Prescott	G. P. Fenstermacher	Catawissa, Pa.
Cape Cod	E. A. Walker	William Cannon	Hyannis, Mass.
Catasauqua & Fogelsville	Thomas Evans	Chas. J. Holbach	Catasauqua, Pa.
Carrolton & Oneida	M. T. Wiggins		Carrolton, Ohio.
Charleston & Savannah	H. T. Calder		Charleston, S. C.
Chesapeake & Ohio	W. G. Freeman	J. N. King	Richmond, Va.
Chesapeake & Ohio	T. J. Hamer		Huntingdon, W. Va.
Cheraw & Darlington	D. W. Haines		Florence, S. C.
Champlain Trans. Co.	H. T. Calder		Burlington, Vt.
Cheshire & Ashuelot	F. A. Perry	F. A. Perry	Keene, N. H.
Charlotte, Columbia & Augusta	Robert King	J. Q. Seats	Columbia, S. C.
Chicago & North-western		Thomas Hull	Chicago, Ill.
Wiscon. Mad. & Mill. Divis		Henry Hull	Fond du Lac, Wis.
Galena Division	R. W. Bushnell	Hugh Gray	Chicago, Ill.
Wiscon. Mad. & Mill. Divis	T. B. Tilton		Chicago, Ill.
Iowa Division	C. C. Elliott	William Campbell	Clinton, Iowa.
Peninsula Division	S. L. Pierce		Escanaba.
Chicago & Alton	John A. Jackman	R. Reniff	Bloomington, Ill.
Chicago, Burlington & Quincy	C. F. Jauriet	W. W. Wilcox	Aurora, Ill.
Keokuk & St. Paul Division	P. R. Sutton	Wm. McElroy	Keokuk, Iowa.
Chicago, Cincinnati & Louisville	C. F. Kidder	D. B. Howe	La Porte, Ind.
Chicago, Rock Island & Pacific	T. B. Twombly	B. K. Verbryck	Chicago, Ill.
Chicago, & Michigan Lake Shore	Wm. L. Fitch	Oliver Udell	St. Joseph, Mich.
Chicago, Danville & Vincennes	J. A. Wood		Momencee, Ill.
Cleveland, Col., Cin., & Indianapolis	L. S. Young	William F. Smith	Cleveland, Ohio.
Cleveland and Pittsburg	N. E. Chapman	A. Steinbrunner	Cleveland, Ohio.
Cleveland, Mt. Vernon & Delaware	J. W. Holloway	J. W. Holloway	Akron, Ohio.
Cincinnati, Hamilton & Dayton	William Cullen	W. H. H. Allison	Cincinnati, Ohio.
Cincinnati & Muskingum Valley	Leroy Kells	Daniel Jewell	Lancaster, Ohio.
Cincinnati & Indianapolis Junction	W. McKinzie	Edwin Beeny	Indianapolis, Ind.
Cincinnati, Sandusky & Cleveland	John Y. Beatty	William Earick	Sandusky, Ohio.
Columbus, Chicago & Indiana Central	(See Pitts. Cinn. & St. Louis)		
Concord	Chs. L. Eastman	M. W. Dickerman	Concord, N. H.
Concord & Claremont	J. N. Lander	A. Langmaid	Concord, N. H.
Connecticut River	John Mulligan	R. Hitchcock	Springfield, Mass.
Contoocook River			Concord, N. H.
Conn. & Passumpsic Rivers	Horace Alden	Horace Alden	Lyndon, Vt.
Cumberland Valley	A. S. Hull	C. W. Nitterhouse	Chambersburg, Pa.
Cumberland & Pennsylvania	W. L. Jordan	J. W. Sauerbach	Mt. Savage, Md
Central of Georgia		C. C. Millar	Savannah, Ga.
Central of New-Jersey	*T. W. Peeples	George Hackett	Elizabethport, N. J.
Central Branch Union Pacific	Wm. D. Rowley		Atchison, Kansas.
Central R. R. of Iowa	O. R. Ford	O. R. Ford	Marshall, Iowa
Central Pacific	A. J. Stevens	Benjamin Welch	Sacramento, Cal.

D

Dayton & Union	A. J. Keenan	J. F. Feicht	Dayton, Ohio.
Danbury & Norwalk	Charles A. Craig		Danbury, Ct.
Dayton & Michigan	William Cullen	W. H. Allison	Cincinnatti, Ohio.

* Mechanical Engineer. † Master of Machinery.

Railroad.	*Master-Mechanic.*	*Master Car-Builder.*	*Residence.*
Delaware, Lackawanna & Western	Walter Dawson	Robert McKenna	Scranton, Pa.
Des Moines Valley	James Lamb	R. E. Smith	Keokuk, Iowa.
Detroit & Milwaukee	B. Briscoe	B. Briscoe	Detroit, Mich.
Delaware & Hudson Canal Co.	James Dickson	Thomas Orchard	Carbondale, Pa.
Rensselaer & Saratoga Div.	W. B. Gage		Troy, N. Y.
Dorchester & Delaware			Cambridge, Md.
Dubuque South western			Dubuque, Iowa.
Dutchess & Columbia	W. G. Vanbuskirk	H. A. Webster	Fishkill, N. Y.
Dunkirk, Warren & Pittsburg	Joseph Haggart	Joseph Haggart	Dunkirk, N. Y.

E

Eastern		J. P. Somerby	Salem, Mass.
Eastern	John Thompson		East-Boston, Mass.
East-Tennessee & Virginia	Eli Hixon	Jos. Armbruster	Knoxville, Tenn.
East-Tennessee & Georgia	Eli Hixon		Knoxville, Tenn.
East Pennsylvania	J. M. Geary	Samuel Reeves	Reading, Pa
Elizabethtown and Paducah		T. A. Cordrey	Elizabethtown, Ky.
Erie Railway	*E. O. Hill		Susquehanna, N. Y.
Erie Railway	James B. Gregg		
Erie Railway	H. L. Brown	C. A. Smith	Jersey City, N. J.
Erie Railway	M. E. Brown	M. Wilder	Buffalo, N. Y.
Erie Railway	W. E. Cooper	W. E. Cooper	Hornellsville, N. Y.
Erie Railway		W. E. Rutter	Elmira, N. Y
Evansville & Crawfordsville	John L. White	A. Sharra (fore'n)	Evansville, Ind.
Evansville, Henderson & Nashville	Jos. Crawford	W. H. H. Price	Henderson, Ky.
European & North Am. (of Maine)	A. O. Bailey	J. H. Brown	Oldtown, Maine.
Erie & Pittsburg	John Young	John Young	Erie, Pa.
Evansville, Terre Haute, & Chicago			Terre Haute, Ind.

F

Flushing & North Side			
Florida	A. W. Taylor	G. Hernandez	Fernandina, Fla.
Flint & Pere Marquette	Sanford Keeler	Sanford Keeler	East-Saginaw, Mich.
Fitchburg	Geo. A. Cooledge	Enos Varney	Charlestown, Mass.
Fitchburg & Worcester	John Webster	Samuel Stevens	Fitchburg, Mass.

G

Grand Trunk	†Richard Eaton	J. W. W. McWood	Montrea.. Canada.
Grand Trunk		Howard Fry	Sherbrocke, Can.
Grand Trunk		B. J. Mitchell	Portland, Me.
Galveston, Houston & Henderson	Wm. Macbeth	Wm. Macbeth	Galveston, Texas.
Grand Rapids & Indiana			Fort Wayne, Ind.
Great Western of Canada	†Wm. A. Robinson	F. Childs	Hamilton, Canada.
Georgia	William Hardman	T. M. Preval	Augusta, Ga.
Greenville & Columbia	J. T. Price	J. T. Price	Helena, S. C.

H

Harlem Extension	George W. Blanchard		Rutland, Vt.
Harlem Extension		C. S. Clapp	Bennington, Vt.
Hanover Branch	John J. Bingley	Henry Britcher	Hanover, Pa.
Hartford & New-Haven	John O. Chapman	F. Leppense	Hartford, Ct.
Hannibal & St. Joseph	H. A. Towne	H. C. Whiting	Hannibal, Mo.
Hartford, Providence & Fishkill	Edwin Garfield	V. D. Perry	Hartford, Ct.
Hackensack & New-York	Abra'm Angausen		Hackensack, N. J.
Housatonic	C. R. Morris	J. Ferris	Bridgeport, Ct.
Houston & Texas Central	George Stevens	F. S. Tull	Houston, Texas.
Houghton & Ontonagon			L'Anse, Mich.
Houston Tap & Brazoria	T. J. Shellhorn	T. J. Shellhorn	Houston, Texas.
Huntington & Broad-Top Mountain	D. G. Gilchrist	M. Tellerhoof	Saxton, Pa.
Hempfield	T. Marsh		Wheeling, Va.
Houston & Great Northern	T. J. Shellhorn	T. J. Shellhorn	Houston, Texas.

I

Indianapolis, Cincinnati & Lafayette		S. Griffith	Cincinnati, Ohio.
Indianapolis, Peru & Chicago	John McKenna	John McKenna	Peru, Ind.
Illinois Central	†S. J. Hayes	H. O. Wadlie	Chicago, Ill.
Chicago Division	George Holton		Chicago, Ill.
South Division	David Oxley		Centralia, Ill.
North Division	J. B. Edams		Amboy, Ill.
Iowa Division	Thomas W. Place		Waterloo, Iowa.
Iowa & Missouri State Line			Farmington, Iowa.
Iron	Perry Scott	Clem. Roetling	Ironton, Ohio.
Indianapolis & St. Louis	J. F. Sechler	R. B. Moore	Mattoon, Ill.
Indianapolis, Bloomington & Western	Tho. V. Losee	Tho. V. Losee	Urbana, Ill.
Ionia & Lansing	H. Loughlin		Lansing, Mich.

J

Jeffersonville, Madison & Indiana	Reuben Wells	John Higgins	Jeffersonville, Ind.

K

Knox & Lincoln			Bath, Maine.
Kentucky Central	J. R. Ledyard	J. L. Hackathorn	Covington, Ky.
Knoxville & Charleston			Knoxville, Tenn.
Kansas Pacific	L. H. Waugh		Wyandotte, Kansas.
Kalamazoo, Allegan & Grand Rapids			Kalamazoo, Mich.
Kansas City, St. Joseph & Council Bluff	H. L. Cooper	H. L. Cooper	St. Joseph, Mo.

L

Lake Erie & Louisville	John Pero		Fremont, Ohio.
Lake Superior & Mississippi	W. McFarland	A. Coburn	St. Paul, Minn.
Lackawanna & Bloomsburg	Chas. Graham		Kingston, Pa.
Lehigh Valley	J. Kinsey.		South-Easton, Pa.
Lehigh Valley	P. Hofecker	E. R. Brown	Weatherly, Pa.
Lehigh Valley	A. Mitchell	Mauch Chunk, Pa.	Delano, Pa.
Lehigh Valley	D. Clark		Hazelton, Pa.
Lehigh & Susquehanna	L. C. Brastow	L. C. Brastow	Wilkesbarre, Pa.
Lehigh & Susquehanna	Wm. H. Brown		Mauch Chunk, Pa.
Leavenworth, Lawrence & Gal.	S. M. Philbrick		Lawrence, Kansas.
Little Rock & Fort Smith	A. Klohs		Little Rock, Ark.
Little Miami	J. H. Setchel		Cincinnati, Ohio.
London & Port Stanley			London, C. W.
Louisville, New-Albany & Chicago	Jacob Losey	Jacob Losey	New-Albany, Ind.
Long Island	Chs. A. Thompson		Hunter's Point, L. I.
Louisville, Cincinnati & Lexington	John Skidmore	S. S. Pilson	Louisville, Ky.
Louisville & Nashville	Thatcher Perkins	Thatcher Perkins	Louisville, Ky.
Clarksville Division	Jas. Montgomery		Bowling Green, Ky.
Lake Shore & Michigan Southern	*James Sedgley	‡John Kirby	Cleveland, Ohio.
Michigan Southern Division	William Hill		Elkhart, Ind.
" " "		S. S. Knapp	Adrian, Mich.
Toledo Division	Geo. H. Tier	Frank O. Bray	Norwalk, Ohio.
Erie Division	L. O. Gassett	J. Withyecombe	Cleveland Ohio.
Buffalo Division	B. H. Kidder	A. Robson	Buffalo, N. Y.

M

Marquette & Ontonagon	A. P. Burroughs	H. D. Lyons	Marquette, Mich.
Macon & Augusta			Macon, Ga.
Maine Central	J. W. Philbrick	J. W. Philbrick	Waterville, Me.
Macon & Western	D. M. Gogul	James A. Knight	Macon, Ga.
Manchester & Lawrence	Chas. L. Eastman	M. W. Dickerman	Concord, N. H.
Macon & Brunswick	M. Thornton	M. Thornton	Macon, Ga.
Maysville & Lexington			Maysville, Ky.
Marietta & Cincinnati	E. Bosley	E. Bosley	Chillicothe, Ohio.
Memphis & Little Rock	N. Greener	C. W. Wooldridge	Huntsville, Ark.
Memphis & Charleston	Michael Burk	A. W. Drew	Memphis, Tenn.
Memphis & Charleston	L. M. Sellars	Fabien Varin	Huntsville, Ala.
Mineral Point	Robert Hay		Mineral Point, Wis.
Mississippi & Tennessee		Henry Teague	Memphis, Tenn.
Mississippi Central	Henry Gibbon	John E. Becton	Water Valley, Miss.
Maryland & Delaware	Samuel Peters		Greensboro, Md.

* General Master-Mechanic. † Mechanical Superintendent.
‡ General Master Car-Builder.

Railroad.	Master-Mechanic.	Master Car-Builder.	Residence.
Mississippi, Gains. & Tus			Gainsville, Ala.
Midland Pacific			Nebraska City, Neb.
Milwaukee & St. Paul	T. S. Davis	Wm. E. Kettridge	Milwaukee, Wis.
Milwaukee & St. Paul		John Baillie	Milwaukee, Wis
Milwaukee & St. Paul	J. Pattee	D. F. Wilson	Minneapolis, Minn.
Hastings & Dakota Division	C. C. Clements		Hastings, Minn.
Michigan Central	A. S. Sweet, Jr.	J. B. Sutherland	Detroit, Mich.
Grand River Valley Division		James Potts	Jackson, Mich.
J'kson, Lans'g & Saginaw Div.	Andrew Wilson	Andrew Wilson	Jackson Mich.
Montgomery & West-Point	J. McVey	W. H Daniels	Montgomery, Ala.
Montgomery & Eufaula	James McCann	I. E. Holmes	Montgomery, Ala.
Mobile & Montgomery	James McFarland	L. Barham	Montgomery, Ala.
Mobile & Girard	William Eyles	A. J. Nix	Girard, Ala.
Mobile & Ohio	L. J. Fleming	John McHugh	Mobile, Ala.
	B. S. Skates	B. S. Skates	Whistler, Ala.
Missouri River, Fort Scott & Gulf	John S. McCrum		Kansas City, Mo.
Missouri River, Fort Scott & Gulf		Josiah Stahl	Wyandotte, Kan.
Missouri, Kansas & Texas	C. T. McIlvaney	J. Townsend	Sedalia, Mo.

N

Nashville & Chattanooga	John U. Eastman	J. G. Sawyer	Nashville, Tenn.
Nashville & Decatur	C. B. Knowles	C. B. Knowles	Nashville, Tenn.
New-Bedford & Taunton	Robert Chase	Robert Chase	New-Bedford, Mass.
New-Canaan			New-Canaan, Ct.
New-Brunswick & Canada	T. Armstrong	T. Armstrong	S'nt Andrew's N.B
New-Haven & Northampton	Henry Fox	Henry Fox	New-Haven, Ct.
New-York & Harlem	Wm. M. Strong	Leander Garey	New-York.
New-YorkCentral & Hudson River	G. B. Van Vorst		Albany, N. Y.
New-York Central & Hudson River	Henry Watkeys		Syracuse, N. Y.
New-York Central & Hudson River	Amos Gould		Rochester, N. Y.
New-York Central & Hudson River		Wm. Johnson	Buffalo, N. Y.
New-York Central & Hudson River	Wm. Buchanan	John McKenna	New-York.
New-York Central & Hudson River	John Dikeman		East-Albany, N. Y.
New-York Central & Hudson River		Joseph Jones	West-Albany, N. Y.
New-York Central & Hudson River		George Rowe	Niagara Falls, N.Y.
New-York, Boston & Montreal	S. W. Tozer	S. W. Tozer	E. Tarrytown, N.Y.
New-York & Oswego Midland	Wm. H. Griggs	Wm. H. Griggs	Oswego, N. Y.
New-York, Providence & Boston	Jas. H. Anderson	Jas. H. Anderson	Providence, R. I.
New-York & New-Haven	H. Kittendorf	M. C. Andrews	New-Haven, Ct.
New-London Northern	J. W. Dow	S. W. Caulkins	New-London, Ct.
New-Jersey Midland	J. E. Wiggins	J. E. Wiggins	Godwinsville, N. J.
New-Jersey Southern	Rufus Blodgett		Manchester, N. J.
New-Haven & Derby			New-Haven, Ct.
New-Orleans, Opelousas & Gt. Western	John McCluskey	Matthew Nolan	Algiers, La.
New-Lisbon			Leetonia, Ohio.
New-Orleans & Ohio	John R. Jordan	John R. Jordan	Paducah, Ky.
New-Orleans, Jackson & Gt. Northern	John Conlon	Charles Bartine	New-Orleans, La.
New-Haven, Hartford & Springfield			Hartford, Ct.
Naugatuck		George W. Gray	Bridgeport, Ct.
Newark & Bloomfield	Luke F. Tronson		Hoboken, N. J.
Nova Scotia	W. Johnson		Bedford, N. S.
North-Carolina	Rufus D. Wade	B G. Sergeant	Co. Shops, N. C.
New-Orleans, Mobile & Texas	Josiah Bettis	W. H. Johnson	Mobile, Ala.
Northern Central	C. M. Lewis		Baltimore, Md.
Northern Central		G. W. Demarest	York, Pa.
North-Lebanon		Henry B. Oves	Lebanon, Pa.
North-Pennsylvania	Franklin Roop	Franklin Roop	Philadelphia, Pa.
North-Eastern	D. W. Haines	A. M. Corrie	Florence, S. C.
Northern	James W. Lander	Albert Langmaid	Concord, N. H.
Northern of New-Jersey	T. W. Demorest		New-York.
Norwich & Worcester	Richard Colburn	G. R. Bentley	Norwich, Ct.
Northern of Canada	James W. Forster		Toronto, Can.
Northern Pacific	†Geo. W. Cushing		St. Paul, Minn.

O

Ogdensburg & Lake Champlain	William A. Short	J. R. Ames	Malone, N. Y.
Old Colony & Newport	J. K. Taylor	A. Gleason	Boston. Mass.
Orange, Alexandria & Manassas	James E. Waddey	John T. Nalls	Alexandria, Va.
Oil City & Pithole	George Thompson		Pithole, Pa.
Oil Creek & Alleghany River	J. S. McElroy	Jacob Williams	Corry, Pa.
Oil Creek & Alleghany	H.J.Bookhammer	John Monks	Oil City, Pa.
Ohio & Mississippi	*F. J. Roth	M. Contant	Cochran, Ind.
East Division	A. Thompson		Cochran, Ind.
West Division	H. Elliott		East St. Louis, Ill.

P

Panama	Chas. E. Stewart	J. G. Wilson	Aspinwall, N. G.
Pacific of Missouri	E. B. Gibbs	E. B. Gibbs	St Louis, Mo.
Pennsylvania	†G. C. Gardner		Altoona, Pa.
Pennsylvania	H. D. Garrett	I. W. Van Houten	W. Philadelphia, Pa.
Pennsylvania	E. L. Caum	Samuel W. Myers	Harrisburg, Pa.
Pennsylvania	G. W. Strattan	John P. Levan	Altoona, Pa.
Pennsylvania	D. O. Shaver	R. S. Ramsey	Pittsburg, Pa.
New-Jersey Division	John Headden	David H. Baker	Jersey City, N.
Philadelphia & Erie	Martin Walls	George J. Mason	Sunbury. Pa.
	W. L Foster	Robt.M.Messimer	Renovo, Pa.
	W. L. Holman	Wm.P. Newcomb	Kane, Pa.
	W. T. Smith	David Cowley	Erie, Pa.
Philadelphia, Wilmington & Baltimore	George W. Perry	George W. Perry	Wilmington, Del.
Philadelphia & Reading	L. B. Paxson	Aaron Steinbach	Reading, Pa.
Philadelphia, Germ'n & Norris'n	John Moyer	Nathan Pawling	Philadelphia, Pa.
Philadelphia & Baltimore Central	S. D. Danfield	SamuelD.Danfield	Chester, Pa.
Pittsburg, Cincinnati & St. Louis	James Ball	James Ball	Logansport, Ind.
	Robert Curtis	Theo. Chamberlain	Columbus, Ohio.
	E. Pierce		Dennison, Ohio.
	Thomas V. Losee	John Gottschall	Indianapolis, Ind.
		James McGee	Steubenville, Ohio.
Little Miami Division	J. H. Setchell		Cincinnati, Ohio.
Little Miami Division		M. P. Ford	Columbus, Ohio.
Peoria & Rock Island	Theo. Mosher		Peoria, Ill.
Pittsburg, Fort Wayne & Chicago	S. M. Cummings	John Marquis	Alleghany, Pa.
Pittsburg, Fort Wayne & Chicago	J. M. Boon		Fort Wayne, Ind.
Pittsburg, Fort Wayne & Chicago		J. J. Kirkland	Crestline, Ohio.

* Mechanical Superintendent. † Superintendent of Motive Power and Machinery

Railroad.	Master-Mechanic.	Master Car-Builder.	Residence.
Pittsburg & Connellsville	D. P. Rennie	J. M. Rutter	Connellsville, Pa.
Peoria, Pekin & Jacksonville	R. F. Hurd	R. F. Hurd	Pekin, Ill.
Peninsular	T. G. Templeton		Battle Creek, Mich.
Portland & Rochester	John G. Brady	John G. Brady	Portland, Me.
Portland & Kennebec	John Ellis	J. W. Trussel	Augusta, Me.
Portland & Oxford Central	Geo. W. Battles	Geo. W. Battles	Buckfield, Me.
Portland, Saco & Portsmouth	John Donnell		Portland, Me.
Port Royal			Beaufort, S. C.
Port Hope, Lindsay & Beaverton	H. G. Taylor	H. G. Taylor	Port Hope, Can.
Port Huron & Lake Michigan	R. C. Stewart	R. C. Stewart	Port Huron, Mich.
Providence, Warren & Bristol	Rufus Smith	J. Brightman	Bristol, R. I.
Portsmouth, Gt. Falls & Monmouth	James Tucker	E. Fall	Union Village, N.H.
Petersburg & Weldon	R. B. Andrews	Alex. Wright	Petersburg, Va.
Providence & Worcester	Joseph Kelly	Olney L. Smith	Providence, R. I.
Poughkeepsie & Eastern	John L. Driscoll	John L. Driscoll	Poughkeepsie, N. Y.

R

Raleigh & Gaston	J. B. Gayle	J. B. Gayle	Raleigh, N. C.
Richmond, Fredericksburg & Potomac	H. Kuhn	W. H. Trainham	Richmond, Va.
Richmond Danville & Piedmont	John McFarland	H. Longest	Richmond, Va.
Richmond & Petersburg	John O'Brien	J. J. Martin	Richmond, Va.
Richmond & York River	C. H. Harris	J. L. Thompson	Richmond, Va.
Rome, Watertown & Ogdensburg	Wm. Jackson	H. H. Sessions	Rome, N. Y.
Reading & Columbia	B. Van Lew		Columbia, Pa.
Rome, Georgia	O. W. Harbin	O. W. Harbin	Rome, Ga.
Rochester & Genesee Valley	M. E. Brown	M. Wilder	Buffalo, N. Y.
Rockford, Rock Island & St. Louis	R. D. Grant		Beardstown, Ill.
Rutland	N. L. Davis	N. B. Allen	Rutland, Vt.

S

San Francisco & San José	R. B. Bishop	Frank Bellisle	San Francisco, Cal.
St. Croix & Lake Superior			New-York City.
St. Croix & Penobscot	Edward Bolton	A G. Page	Milltown, Me.
St. Lawrence & Ottawa	Calvin Dame	Calvin Dame	Prescott, Canada.
St. Louis & Iron Mountain	O. A. Haines	Oscar Doolittle	Carondelet, Mo.
St. Joseph & Denver City	E. Sleppy		Elwood, Kan.
San Antonio & Mexican Gulf	W. T. Bingham		Victoria, Texas.
South Side of Long Island	A. P. Doane	M. Heitzman	Williamsburg, L. I.
St. Paul & Sioux City	Jas. G. Butterfield		Shakopee, Minn.
St. Louis, Vandalia, T. Haute & Ind.	C. R. Peddle	H. Kirmse	Terre Haute, Ind.
South-Carolina	W. B. Smith	John Reed	Charleston, S. C.
South & North-Alabama	Tho. Jeffries	Tho. Jeffries	Lime Station, Ala.
Southern Central	Chas. G. Brown	H. Mooney	Auburn, N. Y.
Southern Minnesota	Wm. Lininger		Wells, Minn.
Southern of Canada	Albert Congdon	Albert Congdon	Fort Erie.
South-Western of Georgia	C. D. Wall		Columbus, Ga.
South-Western of Georgia	D. M.Gogul	James A. Knight	Macon, Ga.
South Shore	Warren E. Ray		Cohasset, Mass.
Stanstead, Shefford & Chambly	W. H. Smith	M. Sessions	Waterloo, C. E.
Schuylkill & Susquehanna	John E. Wootten	John E. Wootten	Reading, Pa.
Seaboard & Roanoke	J. B. Pendleton	J. B. Pendleton	Portsmouth, Va.
Stonington & Providence	J. H. Anderson	J. H. Anderson	Providence, R. I.
Selma & Gulf	Wm. T. Daughtrey		Selma, Ala.
Selma, Rome & Dalton	A. G. Maynes	W. W. Peirce	Selma, Ala.
Sioux City & Pacific	Charles Foster	J. R. Dow	Missouri Val., Iowa.
Spartanburg & Union	J. N. Benner	Jacob Rice	Union C. H., S. C.
Sheboygan & Fond du Lac	J. H. Erwin	J. H. Erwin	Sheboygan, Wis.
Sullivan & Erie			Tonawanda, Pa.
Syracuse & Binghamton, N. Y.	B. G. Merrill	B. G. Merrill	Syracuse, N. Y
Sycamore & Cortland			Sycamore, Ill.
St. Louis & South-Eastern	L. B. Salisbury		Mt. Vernon, Ill.
St. Louis, Kansas City & Northern	John Calhoun	C. S. Buck	St. Louis, Mo.

T

Taunton Branch			Taunton, Mass.
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V

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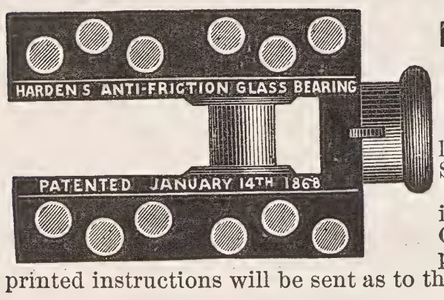

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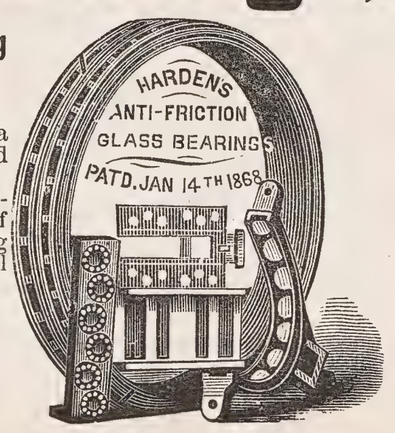

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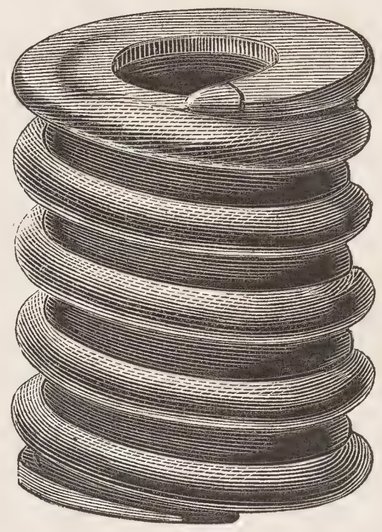

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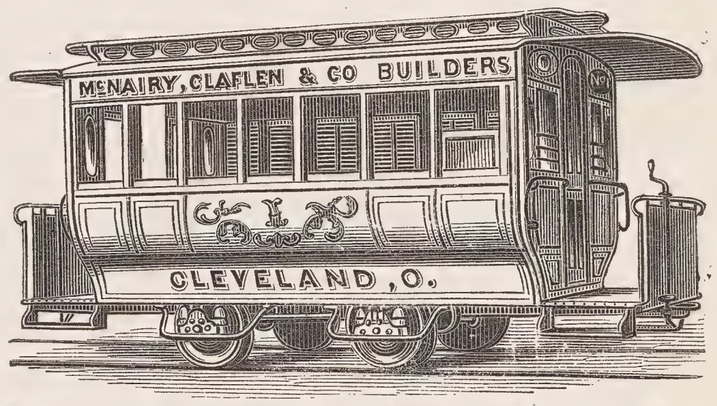

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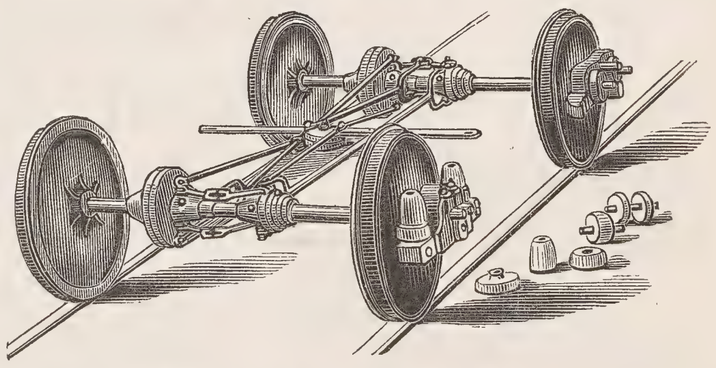

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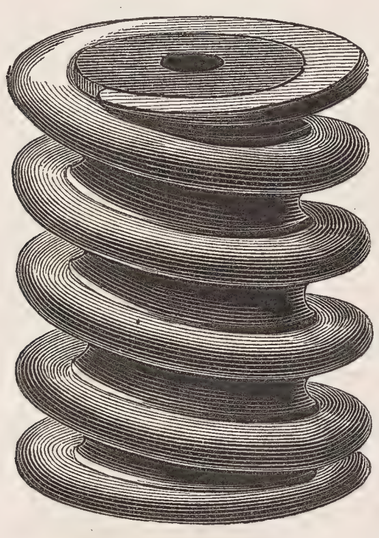

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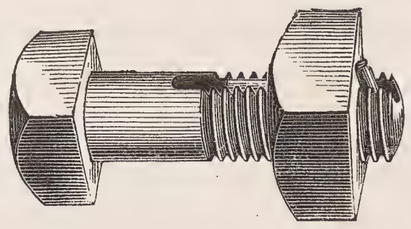
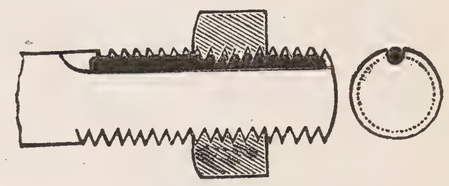


"CUMMING NUT-LOCK,"
Patented
June 16, 1868,
August 23, 1870.



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This simple device, as will be seen by the engravings, consists of a groove being cut in the threaded part of a screw bolt into which is placed a key of copper wire, or other soft metal; when the nut is screwed on, it cuts a thread on the key, thereby making it impossible for the key to get out until the nut is taken off. When the nut is screwed up to its place, that part of the key over which the nut has passed is riveted up against the nut with a small punch, destroying the thread on the key. The nut, therefore, can not move backward until force is used, as with a wrench.

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This is the only method in use that locks the nut firmly to the bolt without regard to place or surroundings, all others require some attachment that holds the bolt in its position, and a washer or other attachment to keep the nut from turning.

DIRECTIONS FOR USE.—Place the copper key in the slot, pointed end out, and beveled side up, in such a position that when the nut is screwed to its place about three-eighths of an inch of the key will project beyond its outer face. Then screw the nut to its place *over the key*, allowing it to cut its own thread in the copper. Then take a narrow flat set punch, and rivet the projecting part of the key *solidly* against the outer face of the nut. To tighten the nut: screw it up, and rivet the key tighter. To remove the nut: simply apply the wrench and unscrew the nut. It will cut its own way out through the copper. The same key can be used several times, by moving it outward a few threads in the slot.

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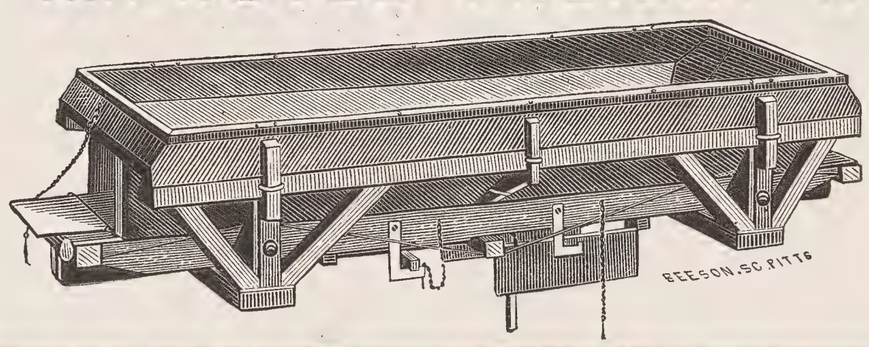

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VOL. IV. 1872.

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ENLARGED, REVISED, RE-WRITTEN.

☞ If the volume for 1871 merited the following notice from the officials of the Union Pacific Railroad, what encomiums should the greatly improved book for 1872 elicit?

UNION PACIFIC RAILROAD,
General Passenger Department,
Omaha, Nebraska, Aug. 9, 1871.

GEO. A. CROFUTT, Esq.,
New-York.

Dear Sir:

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Yours truly,
THOS. L. KIMBALL,
General Passenger Agent.

I concur fully in the foregoing.
T. E. SICKELS, Superintendent.

New-York, Nov. 17, 1871.

From the "Father of the Electric Telegraph."

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It will immediately cool a *hot journal* while the cars are in motion, and no journal will heat where the box is packed with it.

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A Law has passed the Massachusetts Legislature (May 29, 1872) prohibiting the use of oil below 300° fire test, instead of 110° as heretofore. The

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THE LIGHT IS EQUAL TO KEROSENE

and the expense not half that of candles.

To use this oil in our common car lamps, now in use in all parts of the country, it is only necessary to **Change the Burner,** (costing about 50 cents per lamp.) For new lamps, in place of candles, send for lithograph and price-list. This oil is 55 cents per gallon in Boston, New-York, Pennsylvania, etc.

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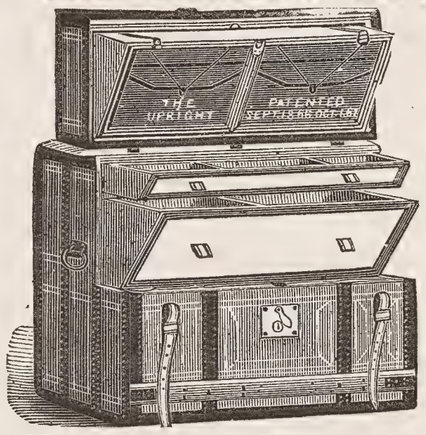

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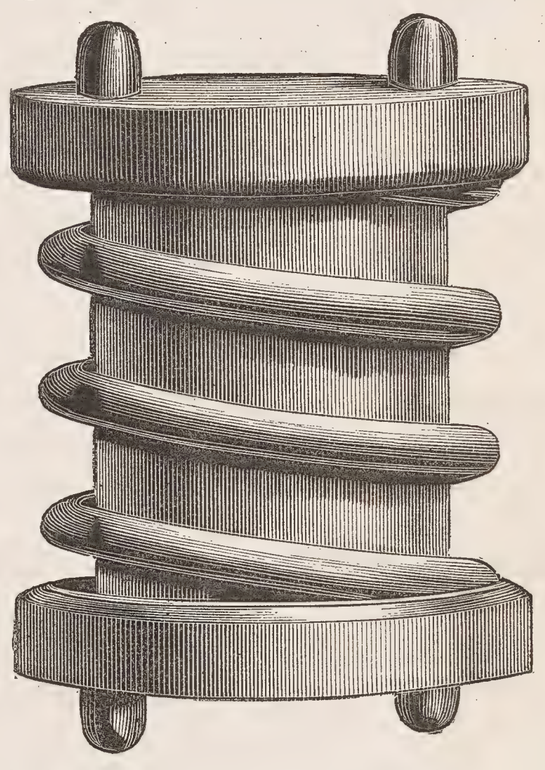

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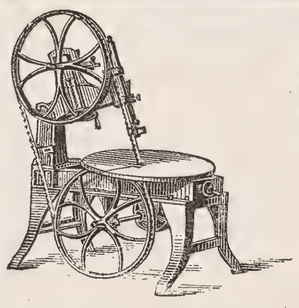

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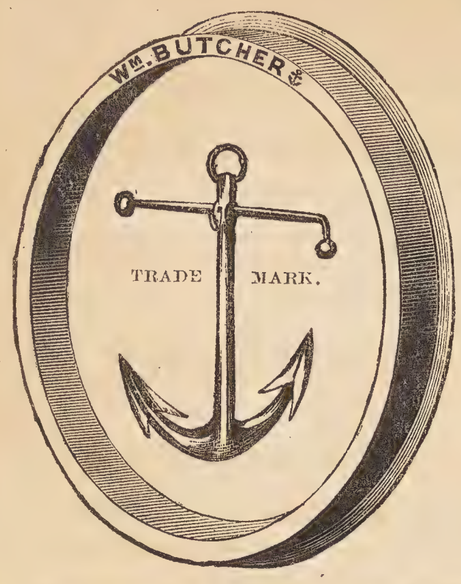

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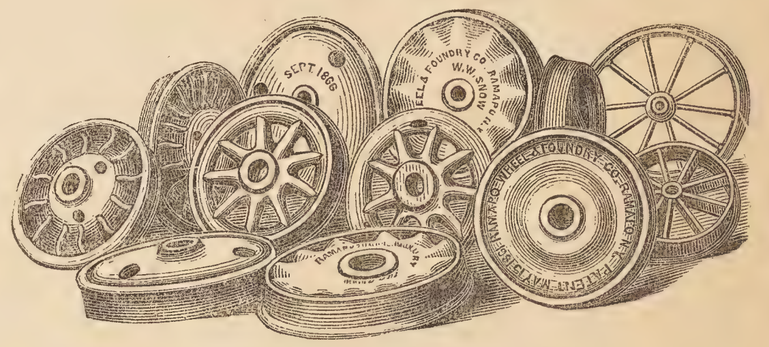

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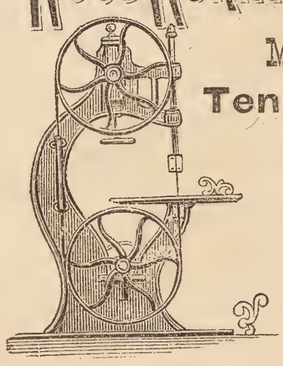

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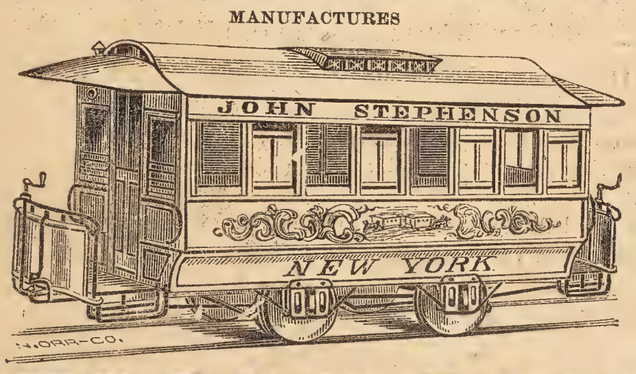

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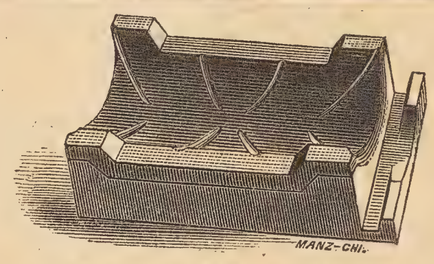

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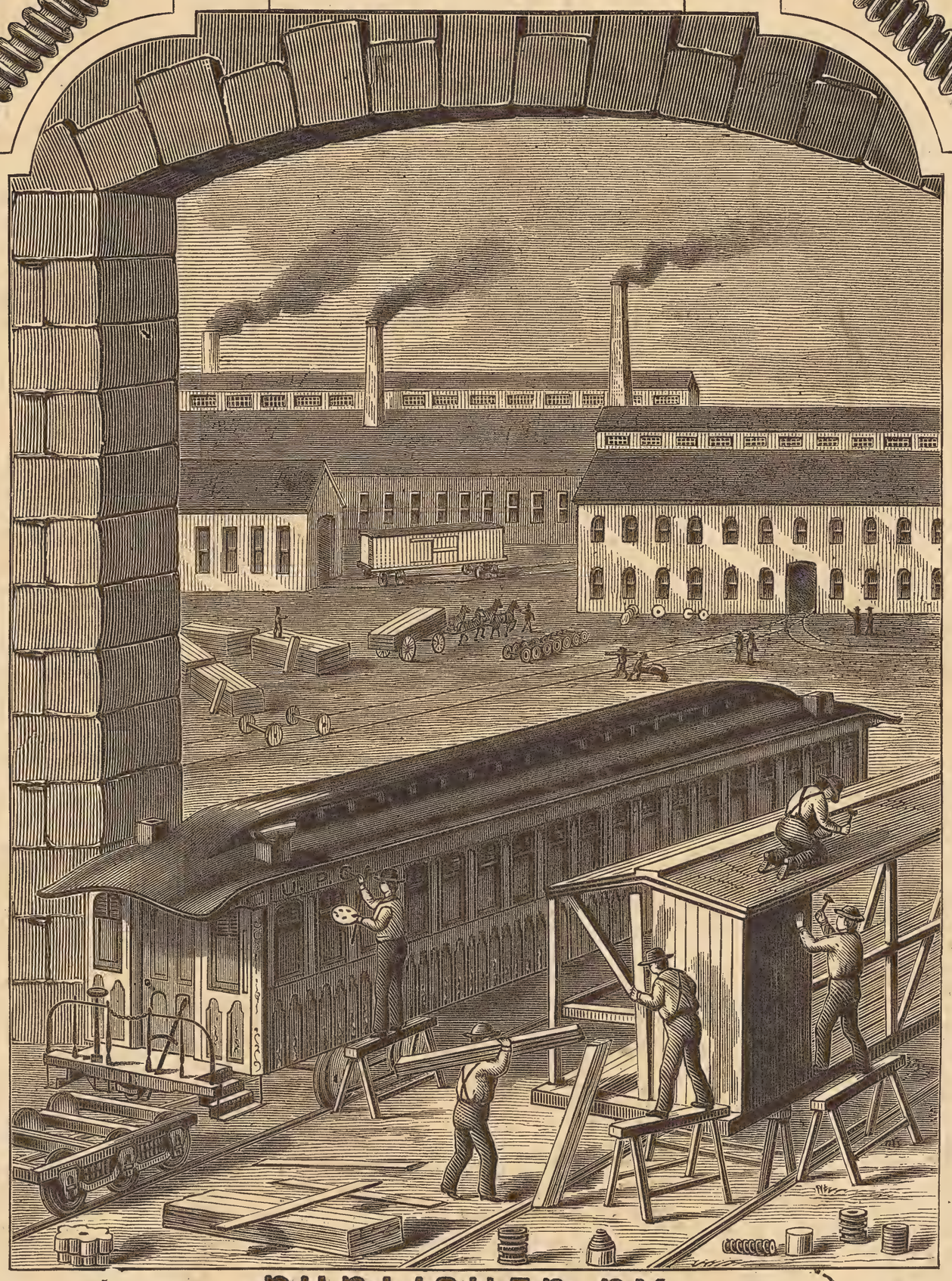

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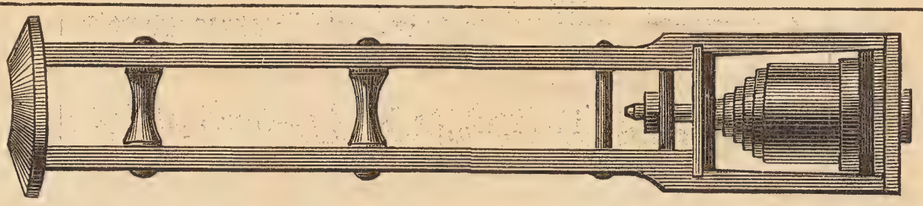

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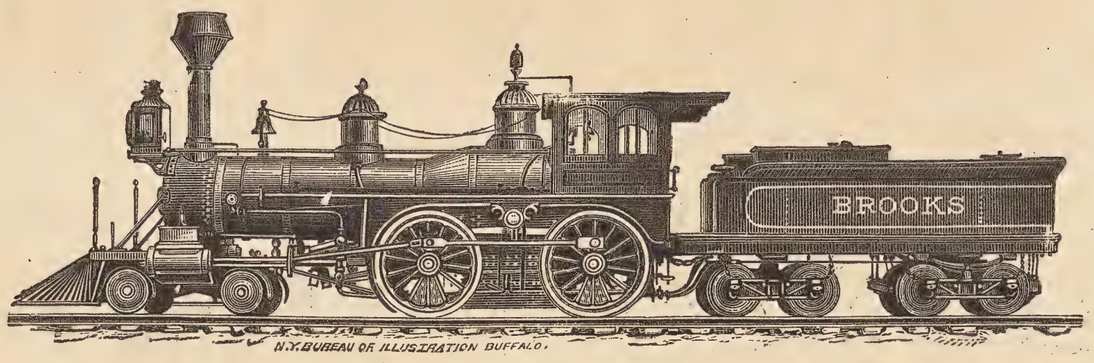

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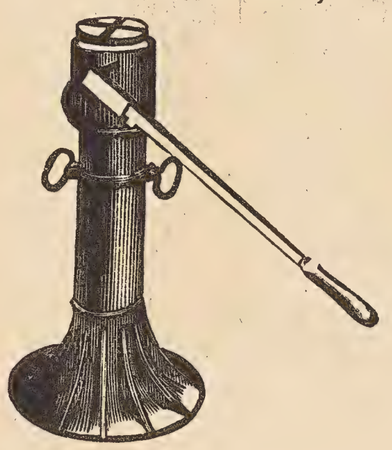

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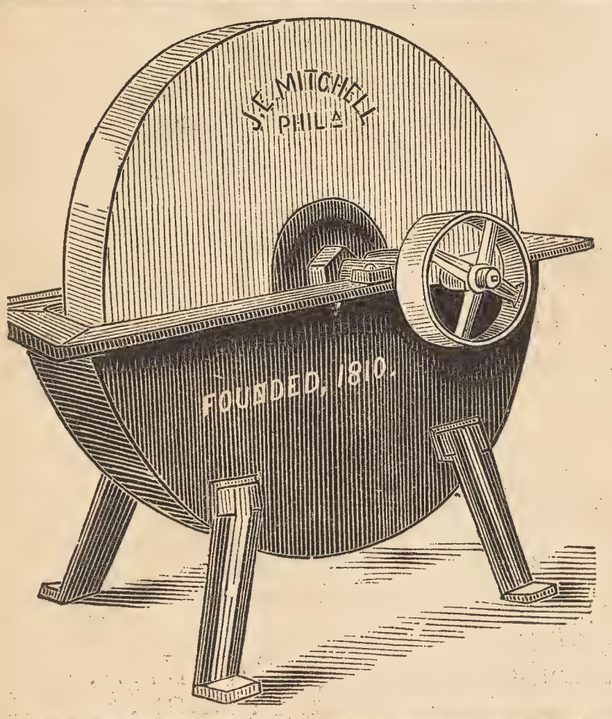

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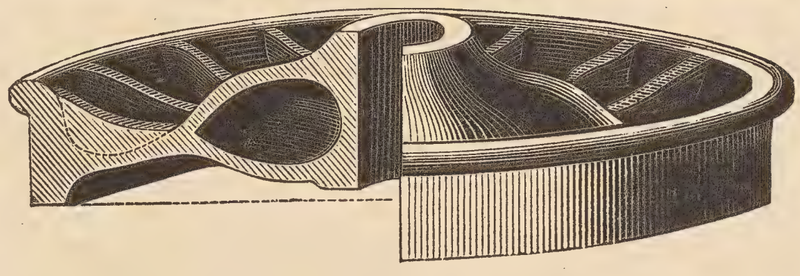

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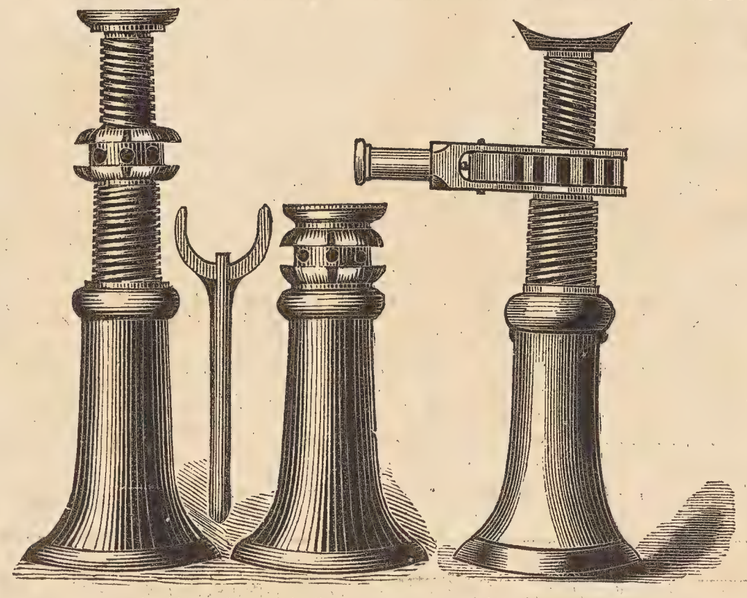

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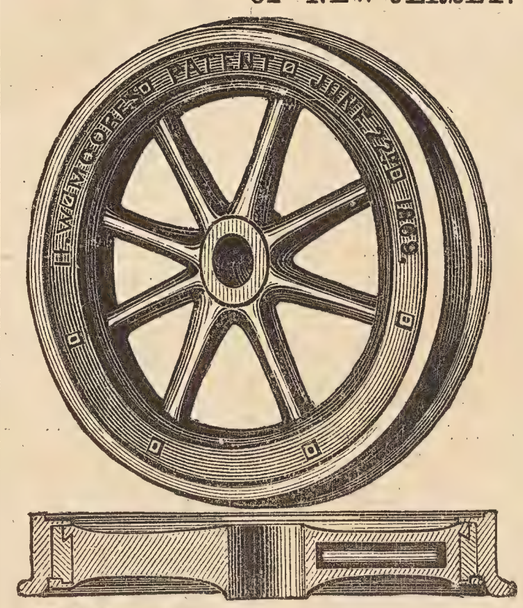

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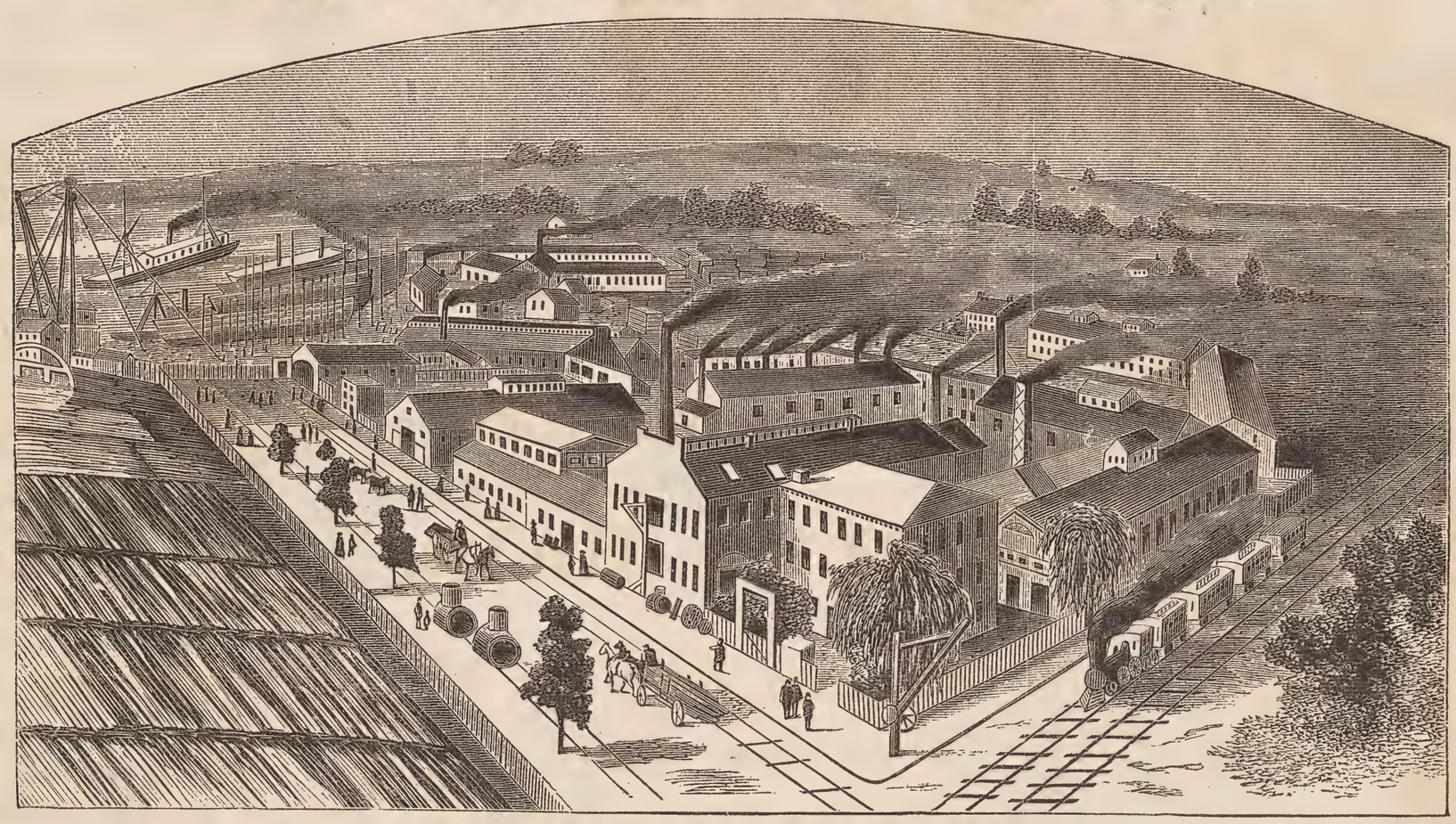

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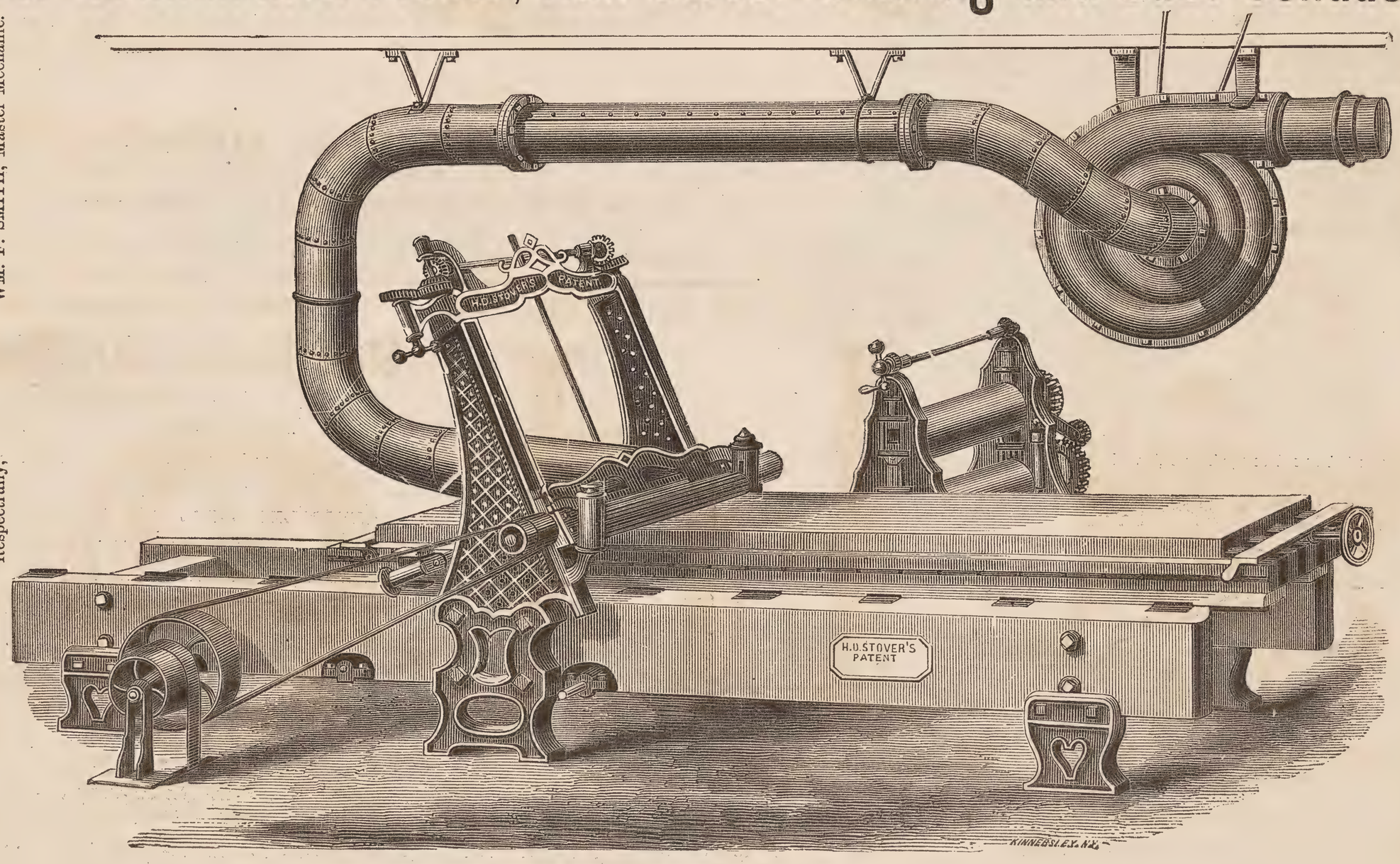

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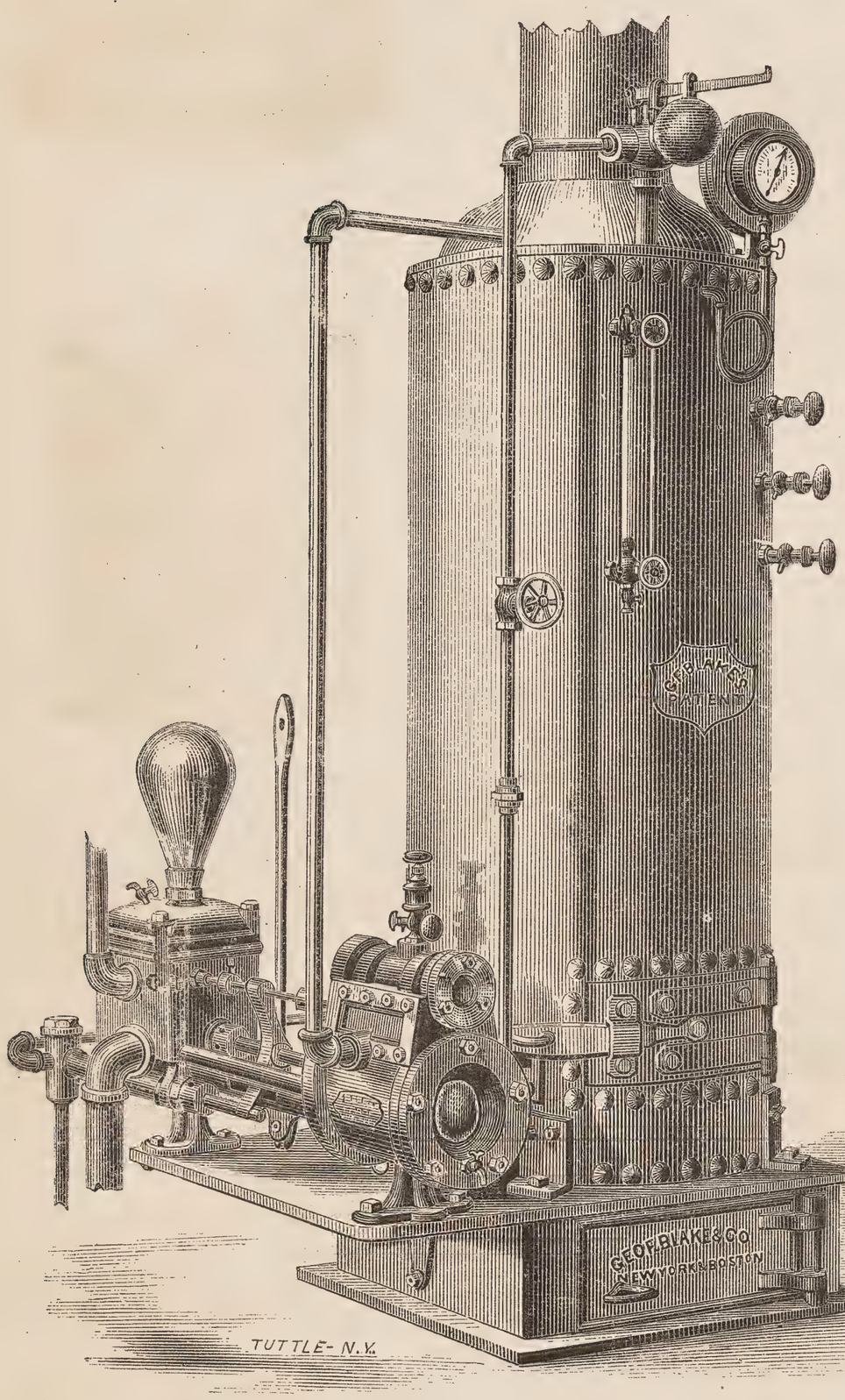

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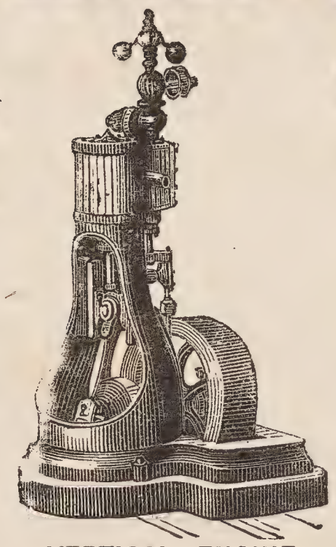

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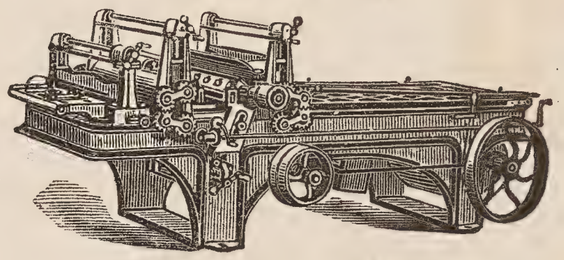

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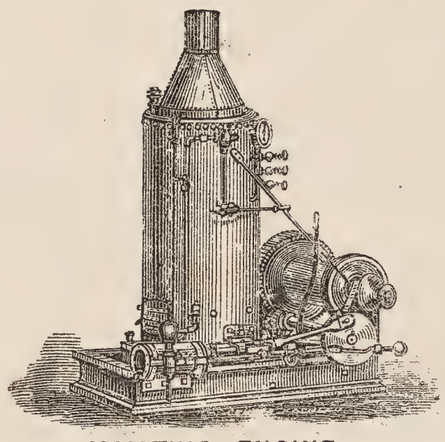

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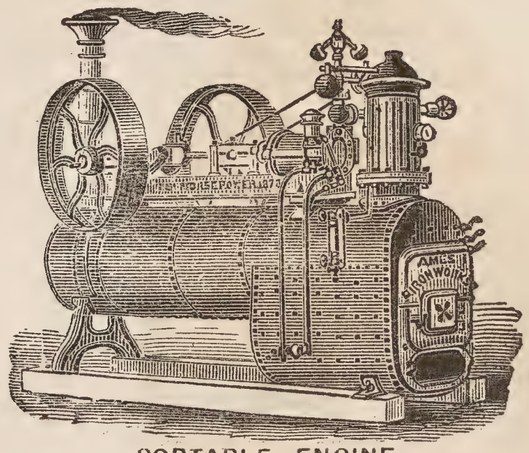

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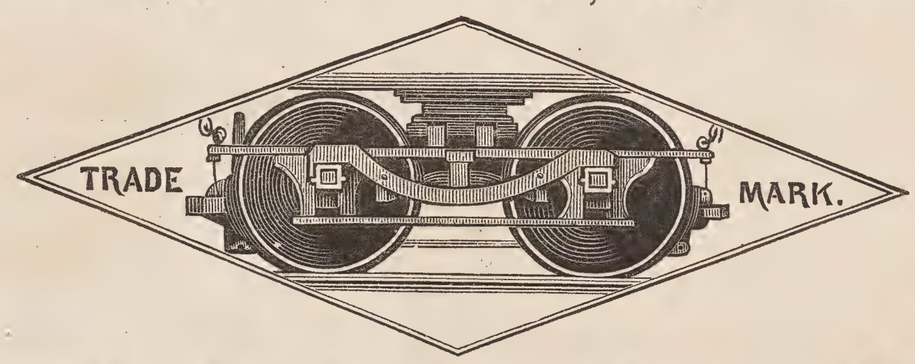

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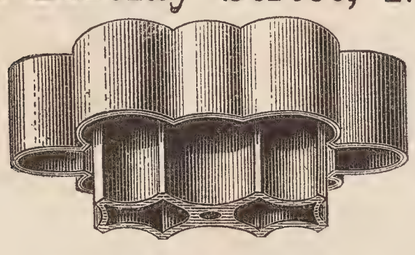

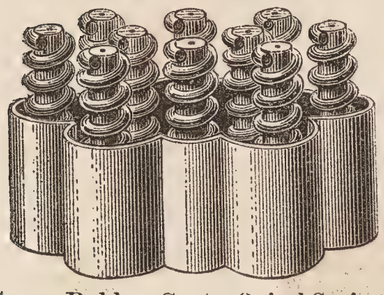

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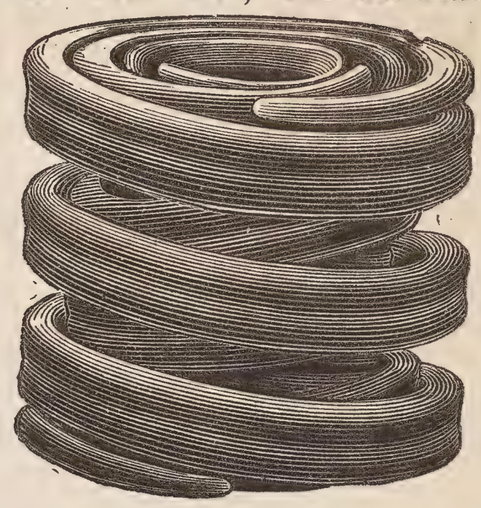

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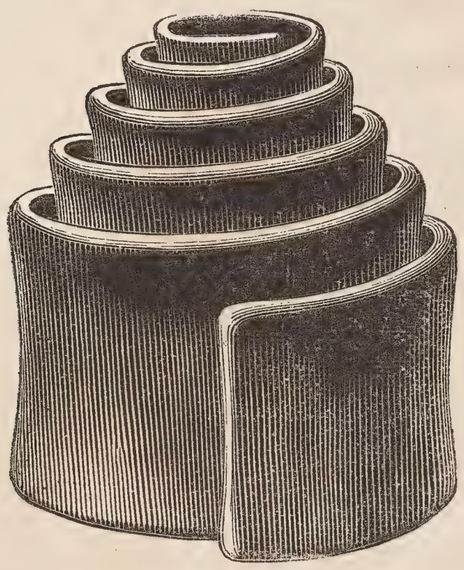

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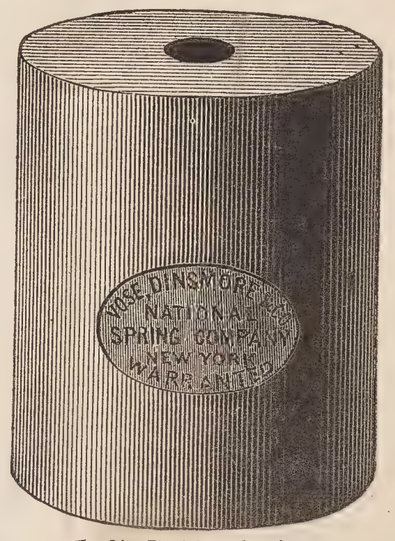

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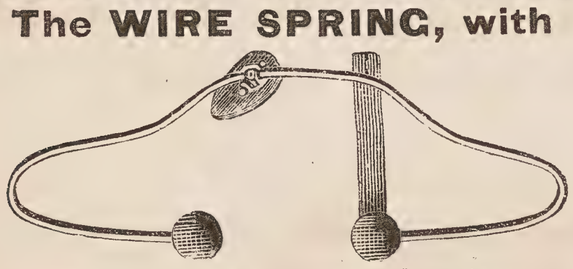

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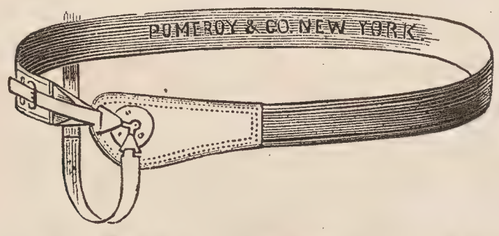

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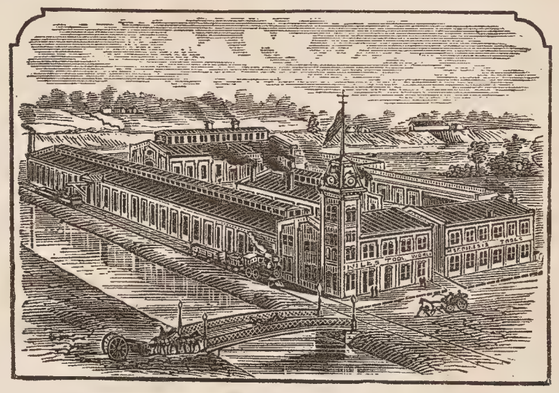

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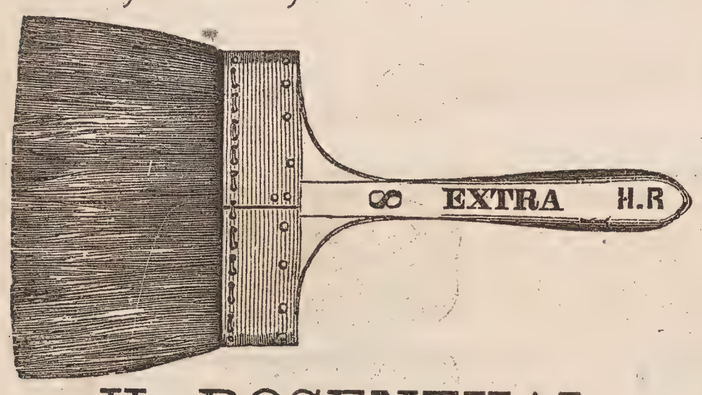

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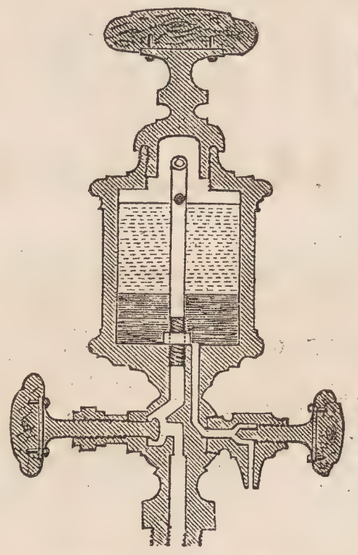

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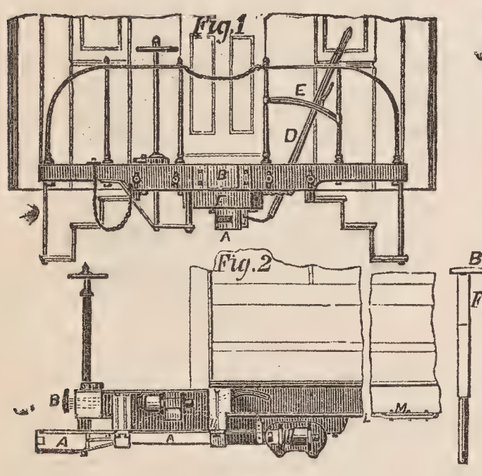

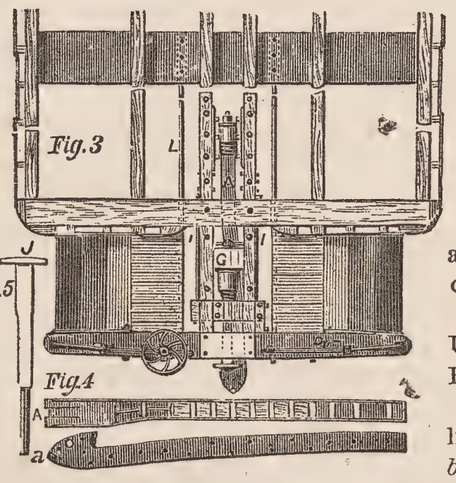

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DESCRIPTION.

Figure 1 is an elevation; Figure 2, a longitudinal section; Figure 3, a plan of an end of a car to which the arrangement has been applied: and Figures 4 and 5 show top and side views of the "Hook" and "Buffer," drawn on a larger scale than that of Figures 1, 2, and 3.

The letters refer to the same parts in all the figures. A is the coupling "Hook," B the "Buffer," C the "Stop," D the "Lever," E the "Quadrant Ratchet," F the "Truss Beam," G the "Spring Beam," H the "Suspender Beam," I the "Upward Trusses," K the "Main Spring," L the "Downward Trusses," and M the "Bolster."

The Platforms, instead of being located below the centre line of the main sills of the cars, are placed *in* that line, and held there by the Trusses I and L, so that the point of contact (in Buffers B) is *in* the said centre line and *not below* it.

The coupling "Hook" A is attached to the draw spring the same as the ordinary draw head, and at the same height above the track, but in such a manner that the outer end is free to move laterally for a short distance. The Coupling Hook projects beyond the platform. The Stop C is placed under the Buffer Beam to prevent accidental uncoupling. When two cars are brought together, the Coupling Hooks, from *their shape*, push each other aside, until the Buffers B are compressed hard on the Buffer Springs, then—*the points of the hooks having passed each other sufficiently far*—the Hooks are carried forward by their main-springs, and thus the "*Coupling*" and "*Compression*" are both effected automatically *and at the same time*, and without the use of links and pins. When two cars are thus coupled together, the *head* of the *Hook* of each car is under the Buffer Beam of its opposite car, and the platforms are close together, (about 4 inches apart.) The effect of this is, *one platform can not be forced over the other*, nor can a *child* fall between the platforms; the dust and rain are nearly all shut out; the "Compression" makes the train run steadily, and prevents all jerking at starting and stopping.

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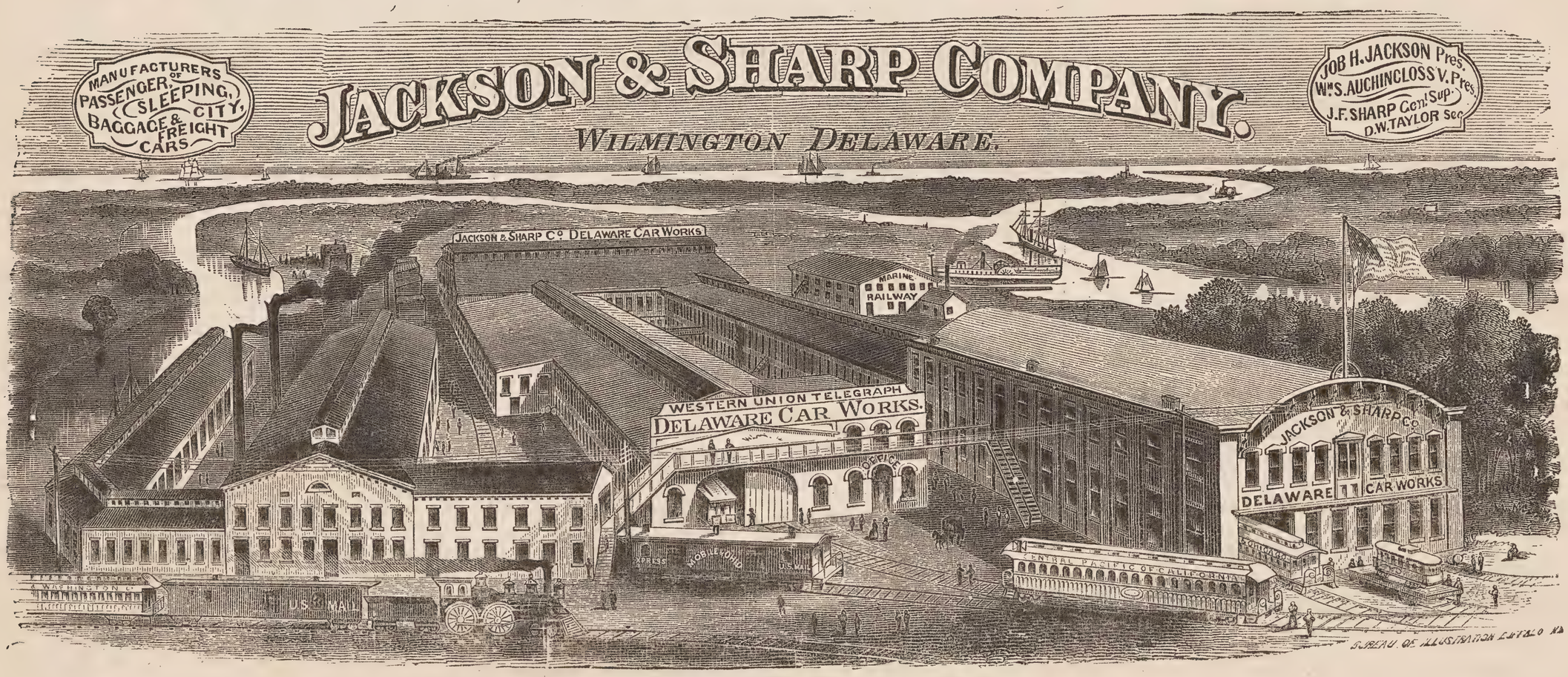
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Concerning Railway Axles.

BY JAMES A. WHITNEY.

A HEAVY percentage of railway accidents comes from defective axles, these parts, with tenders especially, being subjected to greater stress than any other portion of the rolling stock. Not infrequently, the remote cause of disaster lies in the cheap and, consequently, poor quality of the iron employed; sometimes in a mechanical defect which, like a sharply turned shoulder at the wheel-bearing, seems only a little thing, but is in reality a great one; and sometimes in a change, gradual and imperfectly understood, which takes place in the molecular constitution of the metal, from the continued concussion to which it is subjected under heavily laden cars. It is undeniable that proper selection of material, care in manufacture, and thorough testing would largely diminish the number of casualties from this source; but these essentials can only be secured in a high degree at a greater cost than most manufacturers are willing to hazard. Furthermore, the thorough testing, so-called, of axles, as at present carried on, comprises only comparatively crude mechanical means, whereas the object sought can only be fully attained by scientific methods, as yet for the most part only suggested, and, even when practically applied, in the majority of cases merely attempted as experiments. The duty of testing the finished axle belongs to the railway company for whose profit the cars are run, and who are directly responsible to the public for the safety of passengers and freight. How railroad managers can be deceived, if careless, or how they can deceive the public, if culpably economical, was shown by the experience, some two years since, of the Mobile and Ohio Railroad Company, on the adoption of an effective, but somewhat expensive, plan of testing the axles furnished to their line. This comprised making each axle in the first place long enough to permit the removal of test pieces from the ends, which were subjected to severe trial, to afford presumptive proof of the condition of the whole. This resulted in the return to the manufacturers of three fourths of the axles furnished. On the other hand, that good axles can be made is shown with equal definiteness by tests made last year with axles of Bessemer steel, under the direction of the engineering department of the Pennsylvania Railway Company. These axles had a diameter of four and one sixteenth inches, and the standard of trial was that ordinarily adopted by the company, five successive blows from a drop weighing sixteen hundred and forty pounds, and falling twenty feet. The results showed a resistance in some of the axles to the breaking force seven and seven tenths greater than the common standard, while the weakest of the six experimented upon was three and one half times the standard. The axles were reversed at each stroke, and the test was certainly a severe one. But there is probably a great difference between the effect produced by a small number of heavy blows, and that insured by an almost infinite succession of concussions. An illustration of this general truth concerning the deterioration of metals under jar was shown quite a number of years ago, in experiments with a machine for forging nails, in which the hammers were attached to metallic helves. No matter how strong originally, or how capable of resisting forcible and sudden strain applied for a limited time, the comparatively light, but rapidly succeeding, taps upon the hot nail-rod destroyed the integrity alike of steel and fibrous iron, and the machines were finally given up for this reason. On a larger scale, this is what happens when a railway axle is kept in use for a long time; and for it there seems to be no remedy except to condemn every axle, even when made with every guaranty of approximate perfection, after it has run a certain number of miles. But when the constitution of steel and fibrous iron are compared, there seems good reason to believe that the latter, when of first quality, and wrought into shape in such wise as to avoid detriment to its natural or inherent strength, will be found practically superior, for the price, to Bessemer metal. But to effect this, some changes in the method of manufacture must be adopted which will be really radical in character, and to many apparently impracticable.

The ideal axle would have its metal as dense as possible, and hence would be shaped mainly by hammering. Its fibres would run unbroken throughout its length, and the tough outer skin, which, in wrought, as in cast-iron, is much stronger than that within, would be preserved in its integrity; and to secure these conditions, the usual turning off of the surface would in some way be avoided. It has been reported in foreign technical journals that axles have been rolled complete, and when it is remembered that cold-rolled shafting is now made that varies but little from the requisite form, the problem of thus perfectly shaping so simple a thing as an axle would certainly appear to be within reach of the inventive and mechanical genius of the time. But the rolling process should be confined to finishing the axle, its shaping being mainly done by the hammer. It is, of course, to be admitted that trials of both rolled and hammered axles have led to directly opposite conclusions as to their value among experienced engineers; but the well-known difference between the compressing action of rolls and the condensing action of hammers points to the superiority of the latter for the heavy work, while to the former should be relegated the finer operations which should give the symmetry of surface and accuracy of fit ordinarily derived from the contact of the lathe-tool. There would further be the advantage in the universal adoption of this mode of fabrication, that it would be difficult to give the sharp corner at the inner end of the wheel-bearing, which constitutes one of the most prolific sources of evil in the working of car-axles.

But this practice of making sharp corners, aforesaid, is not only one of the most fruitful of danger, but one of the most foolish that practical men have ever systematically committed in the construction of machinery. It is thirty years or more, since Rankin found and published the discovery, that at such a corner an annular or circumferential groove will sooner or later form, and continue to deepen until the central portion becomes too much diminished to bear the shock of any unusual jar. The ordinary "tapping" will, in aggravated cases, enable such a flaw to be detected; but no skill and no care will guard against the slow but sure approach of danger, because of the unnecessary removal of a few annular chips at the shoulder of the wheel-bearing to gratify the whim of the turner.

Allusion has been made to the testing of axles, mechanically, by heavy drops, and although such methods of themselves have a tendency to weaken the axles, just as cannon are weakened by heavy proof charges, there is little doubt that in the present state of the art the practice will have to be retained. The severity of such tests could, however, be diminished, and their utility increased if used in connection with methods of more recent origin and more scientific character. It is some time since Saxby's mode of testing the homogeneity of metal was introduced abroad, and proved capable of indicating flaws undiscovered by ordinary agencies. This was illustrated by boring a hole in a large paddle-wheel shaft, plugging it with wrought-iron, and then turning down the whole until the place was undistinguishable to the eye; the deflection of the needle, however, showing it in an instant. This plan has been proposed for testing boiler-plates and railway-rails, and there seems to be no good reason why its application for the same purpose to axles should not give most satisfactory results. The general character of the metal could also, according to the most recent statements of Schott, be accurately determined by the aid of the microscope, the crystallized structure of steel and cast-iron being converted in wrought-iron into one composed of superposed parallel leaves. Among other notable modes suggested for ascertaining the true condition of axles is that of Sir Joseph Whitworth, which comprises boring a longitudinal hole an inch in diameter centrally through the axle, with the idea of discovering any internal flaw. But this at best would only prove a partial safeguard, and although with Whitworth's perfect machinery the cost would only be one shilling and sixpence, English, it would ordinarily be too great for extended railway practice.—*Railway Times.*

THE work upon the St. Louis bridge is going forward rapidly. The superstructure will be completed about the middle of August. The upper roadway will be about 54 feet wide, including two sidewalks, each 8 feet in width. This leaves a width of 38 feet, which will be divided into 4 tramways—2 for street-cars and light driving, and 2 for heavy teams. Underneath the above will be a double-track railroad. It is thought that both the bridge and the tunnel will be finished in a year from this time.

The Harlan & Hollingsworth Company's Car-Works.

THIS establishment is one of the oldest, if not *the* oldest, railroad car manufactories in the country. It was organized and commenced operations at Wilmington, Delaware, in 1833, under the firm of Betts, Harlan & Hollingsworth. Mr. Hollingsworth, the President of the company, is the only survivor of the original firm, and is still actively engaged in the management of the business. In 1845, they commenced building iron ships, which has ever since formed an important branch of their business.

The car-shops of the Jackson & Sharpe Company, and Bowers, Dure & Co.—both in Wilmington—are offshoots from the older establishment of the Harlan & Hollingsworth Company. Both Mr. Jackson of the one company and Mr. Bowers of the other were formerly foremen in the Harlan & Hollingsworth shops.

The location of Wilmington gives extraordinary facilities for the business of car manufacturing. Occupying a central position between the North and the South, with facilities for shipping either to the East or the West, and accessible to the lumber regions of Pennsylvania and the far South, and within easy reach of both anthracite and bituminous coal and iron, its manufacturers are able to compete with any other section, both in the cost and quality of the cars built. Of these advantages the car manufacturers of Wilmington have not been slow to avail themselves, as is indicated by the extent of their business.

At the present time about a thousand men are employed in the two departments of the Harlan & Hollingsworth Works, somewhat less than half of them in the car department and the rest in ship-building. The proprietors now contemplate enlarging the car department by the erection of a new shop 135x200 for finishing and painting cars. The new building is to be of two stories, the upper part to be devoted to upholstering, varnishing, and cabinet-work. This will increase the capacity of their establishment very materially.

The present shops are the production of a slow growth and have been extended as the demands of an increasing business required. Their arrangement is consequently somewhat irregular. The erecting-shop is 181x41½ feet; the planing-mill, 104x22x63 feet; timber-shop, 101x66½ feet; the finishing-shop, 115x70 feet; and the blacksmith-shop, 140x44 feet.

The work done is sent all over the country. The orders which are at present being executed are from the Eastern, the Providence and Nashua, Southern Central of New-York, New-York, Boston and Albany, Wilmington and Western, Great Western of Canada, and Lehigh Valley roads, besides numerous orders from the Pullman Palace-Car Company. The finish of some of the Pullman drawing-room-cars is the most perfect we have ever seen. They have six-wheeled trucks, and are finished inside with walnut, Hungarian ash, bird's-eye maple, amboine, and inlaid with wood of different colors and in beautiful patterns, so that the comfort of these cars is quite equal to that of a luxuriously-furnished drawing-room. They all have the Baker hot-water heater and Creamer ventilators.

We saw no very marked novelty in the design or construction of their cars, but the work is all done in the most thorough manner and in excellent taste. Nearly every thing connected with the cars which they build is done in their works, even to the designs for their head-linings. In this connection, it might not be amiss to call the attention of car manufacturers and railroad men to the style of head-linings which have become standard on American railroads, and to suggest that they might be varied to advantage if some new ideas were introduced into their design. The Pullman Company have done most to introduce the present styles, which have been varied almost infinitely. Nevertheless, the same *motive* is apparent in nearly all of them. If, now, a company intending to build cars should offer premiums for the best designs for the head-linings, it might secure the greatest variety in the patterns and call out a different kind of talent from that which it can hire for from three to five dollars per day. There are many young and unemployed artists who might thus supply themselves with bread and butter, when other orders more to their taste are not forthcoming.

The Harlan & Hollingsworth Company is now employed to its full capacity, in both car and ship-building departments. As stated before, it is about to enlarge the capacity of the former, to meet the demand for cars which the rapid extension of new roads and increase in the traffic of the old have created. —*Railroad Gazette.*

The New Railroad Bridge at Albany.

THE largest double-track iron bridge ever built in this country has recently been completed, and now spans the Hudson River between East-Albany and Albany. The work was commenced on May 24th, 1870, and the first stone of the substructure was laid on the succeeding June 25th.

The main bridge is 1525 feet long, and consists of seven spans over the basin, thirteen feet three inches each from centre to centre of piers; four fixed spans over the main channel, 185 feet each, and a draw 274 feet long, with two openings of 111 feet each in the clear. The curve of the bridge over the basin is on a radius of 710 feet. The main bridge is thirty feet above low-water and eight feet above high-water mark, and is constructed on a vertical curve having a rise in the middle of fifteen inches. The whole length of the bridge, together with its approaches, including an embankment crossing Van Rensselaer island, on the east side of the river, is 2250 feet, thus being equal to 4500 feet of single track bridge. The abutments and piers are built on pile foundations; 160,000 yards of stone being used in their construction. The draw weighs 700,000 pounds, and can be worked either by steam or by hand, the engine and boiler of ten horse-power being located beneath the roadway.

The superstructure consists of 2000 tons of iron, mostly wrought, its trusses being twenty-six feet apart in the clear. The tension-bars are made of double refined iron, and the fabric is calculated to stand a load of 6000 pounds per lineal foot exclusive of its own weight. The strain to which the bridge would be subjected under this load would not exceed one sixth of the breaking weight. It is estimated that the structure would sustain a continuous train of locomotives on each track, reaching from end to end of the bridge.

The entire cost of the structure was one million dollars. It is at present used for the crossing of freight trains and also for foot-passengers, pathways on either side of the tracks being provided. The regular trains of the Hudson River road will not discontinue crossing the old bridge until the new depot in Albany, which has just been begun, is completed. Messrs Bagley and Hilt, both well-known bridge-builders, were intrusted with the supervision of the work, and Mr. Charles Hilton, of Albany, was engineer-in-chief.—*Scientific American.*

A Screw Car-Brake.

A WRITER in the Boston *Daily Advertiser* thus describes a new device for a car-brake, which he evidently thinks will supersede all others now in use: Letters-patent have just been granted to Mr. William Kimball, of Woburn, Middlesex County, Mass., for a new car-brake, which is really new in conception, original in design, quick in working, easy of control, simple in construction, not liable to get out of order, and easy of application to all vehicles of locomotion that require the use of a brake. Like the secret of Columbus's egg, it is a great wonder that no one of the thousand inventors ever thought of it before. Mr. Kimball employs the familiar power of the screw instead of levers. This is the most effective of the mechanical powers. With a screw, threads one half an inch apart and a lever one hundred inches long, a force of about eighty pounds will raise one hundred thousand pounds. The screw is adjusted so as to set the brake directly on to the circumference of the wheel, and by a backward motion of half an inch the brake is withdrawn from the wheel. The screws are placed opposite each wheel, and are connected by an endless chain to a shaft which runs the whole length of the car and then is connected with a brake-wheel on the platform, which revolves vertically like the wheel of a vessel. A motion of only a quarter of a circle is sufficient to set the brake or unset it. In this it will be seen that there is no loss of motion by whirling the wheel around several times before it bites, as in the ordinary brake. Besides, this arrangement of the Kimball patent covers a single screw which is inserted into the middle of the ordinary cross-bar of the present brake.

It is intended to operate the brake by hand-power, at present. Still, Mr. Kimball has devised a connection so that a whole train may be "braked" by the engine-driver, as in the case of the Westinghouse. The great simplicity of the brake, we believe, allows of its being applied to the locomotive driving-wheels, which is such a desideratum that Mr. Heberlein has been lately awarded by the English government the sum of £20,000 for his invention of a brake for locomotives.

Weight of Cars.

A CORRESPONDENT of the *Railroad Gazette* furnishes the following statement in regard to the weight of cars on the Pittsburg, Fort Wayne, and Chicago Railway:

"The standard passenger-coach on this road weighs 47,350 lbs.; it will seat fifty passengers; distance from centre to centre of seats, 36 in., (giving ample room for passengers;) length of seat inside of arms, 38⅜ in.; width of seat, 17½ inches. These cars have six-wheeled trucks, one of which weighs 9540 lbs. (The trucks are included in the "weight of coach.") The axles are steel, one of which weighs 332 lbs.; the wheels are broad-tread, weighing 548 lbs. each. These cars were built for comfort and to run at high rates of speed. I do not think they could be lightened much, and be as safe in case of accident as they now are. Six-wheeled trucks are used for safety and for making an easy riding coach.

"One flat-car weighs 14,410 lbs.; the floor (or loading area) is 8 ft. 11½ in. wide, 28 ft. 1 in. long. To start one of these cars (empty) requires a force of 150 lbs.; to keep it moving after started, 50 lbs., (measured by a dynamometer.)

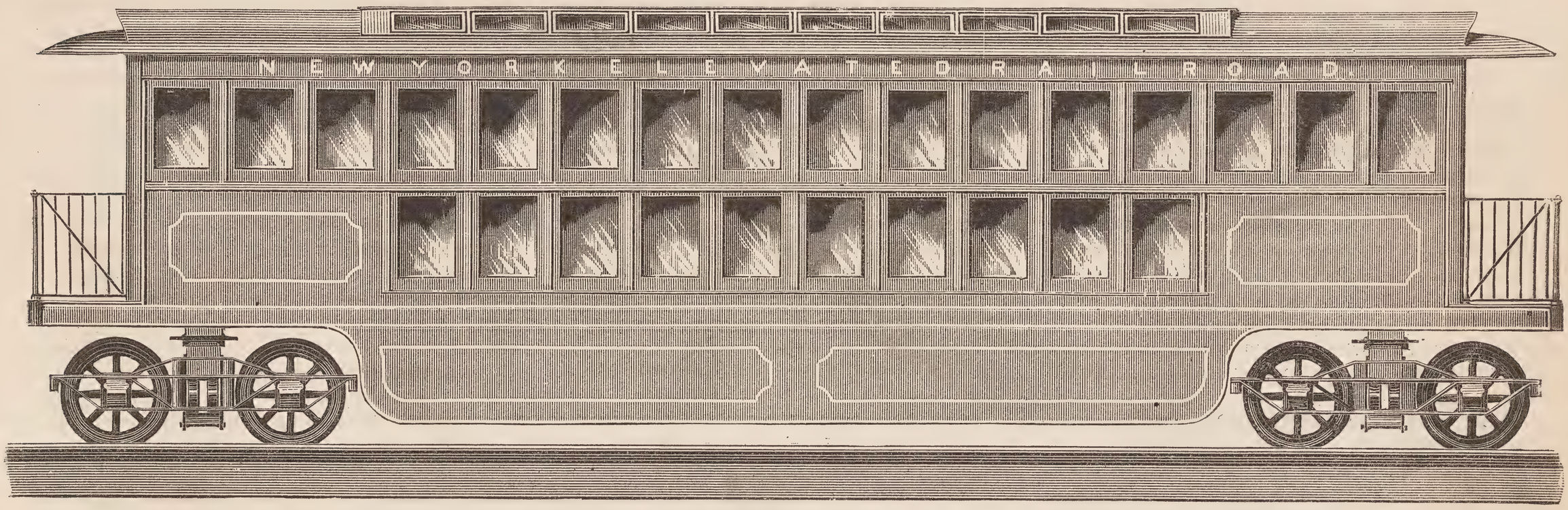
"One box-car weighs 17,000 lbs.; inside measurement, in the clear, 7 ft. 9 in. wide, 27 ft. long and 5 ft. 11 in. high. To start it (empty) requires 250 lbs.; to keep moving, 50 lbs.

"One stock-car weighs 17,000 lbs.; inside measurement in the clear, 8 ft. 1¾ in. wide, 27 ft. ¼ in. long, and 6 ft. ½ in. high. To start it (empty) requires 250 lbs.; to keep moving, 50 lbs. The dynamometer used was a 'home-made' one, and was pretty accurate according to our tests.

"The flat, box, and stock-cars all have the same kind of truck, the weight of which is 3915 lbs.; one axle weighs 295, and one wheel (broad-tread) 570 lbs. The trucks will run on a 4 ft. 10 in., 4 ft. 9½ in., 4 ft. 9¼ in., and 4 ft. 8½ in. gauge of track. The load allowed to be carried in these cars by rule of company is 20,000 lbs. It is a common occurrence for them to be overloaded. I have known 32,000 lbs. to be loaded on one of our flats. We are well aware they will carry more than 20,000 lbs., but we think that to be a safe load.

"The weight of one Pullman sleeper is 55,400 lbs. To start this car, took a power of 800 lbs.; to keep moving, 250 lbs.

"We have on one of the branches some light coaches that will seat thirty people, weighing (the coach, not the people) 21,450 lbs. These cars I do not consider safe to run at a higher speed than 15 miles per hour; when that speed is exceeded, they jump so badly that there is danger of their leaving the track."

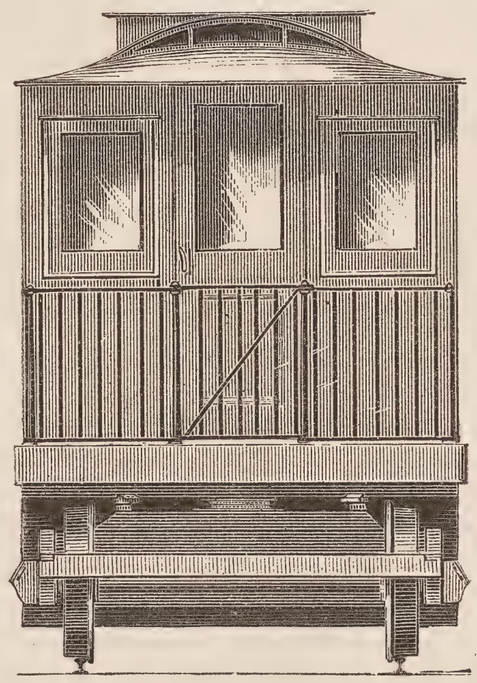


Car for Elevated Railroad.

THE accompanying engraving, for which we are indebted to the *Railroad Gazette,* represents one of the four new passenger-cars now running on the Greenwich Street Elevated Railway track, in this city. A general impression has for some time prevailed that this enterprise had resulted in a complete failure, but such is not the case. The attempt at first made to run cars by an endless wire rope, propelled by stationary engines, was abandoned some time ago as impracticable, and the track structure was regarded as a failure and nuisance. The alternative presented was whether it were better to sell the road for old iron, or attempt to run trains by some other method. The latter plan was decided upon; a dummy engine was placed on the track, and attached to two or three second-hand horse-cars mounted on trucks. These trains have for several months past made twenty-eight trips per day. The cars have frequently been mentioned in the discussions on the subject of dead-weight, and are probably the lightest per seat of any passenger-cars drawn by steam, and having trucks. The making of regular trips gradually restored public confidence, and as no more passengers were allowed in the cars than could be seated—a thing unheard of before in New-York street-car transit—the insufficiency of rolling stock was a subject of loud and frequent complaint.

A style of car especially adapted to the track and the peculiar service required, was not an easy thing to devise. It was imperative that a minimum weight must be combined with a maximum carrying capacity, while weight and side-strain on a given point must not exceed a fixed limit. Thus, while it was possible to materially reduce the weight per seat, it is evident that the total weight upon the wheels would be increased, which in this case must not exceed a certain quantity. The solution of the matter is the car represented by the engraving. Its extreme length, including platforms, is 35 ft.; from door to door, 30 ft. 6. in; height of bdoy inside, 9 ft. 6 in.; over the truck, 6 ft. 8 in.; height of doors, 6 ft. 1 in. The gauge of the road being 4 ft. 10 in., the car overhangs about a foot each side. The trucks are pivoted almost under the doors. The leading feature, however, as will be seen by the engraving, is the drop or lower deck between the trucks. This central depression is two feet lower than the platforms, and only six or eight inches above the track, thus lowering the centre of gravity and placing the larger part of the load lower than the bearings on the trucks, so that the car can not easily be overturned. The car contains forty seats, which are placed along the sides as in ordinary street-cars, and the total weight of the vehicle is 9400 pounds, or 235 pounds per passenger, a somewhat remarkable result to be attained on the track gauge above named. The axles are 3 inches in diameter, and the wheels 28 inches, both steel. The cars are drawn from the truck transoms and not from the platforms. The four now running were built by the Jackson & Sharpe Company, of Wilmington, Delaware.

The easy motion of the lower part of the body, which is decidedly different from the motion of the ends of the car, as well as from that of the middle of ordinary cars, suggests the idea of adopting this style of construction for palace or drawing-room coaches. The advantages would be a great increase in length, the use of twelve-wheeled trucks, if desired,



and the lowering of the centre of gravity very considerably. The weight per wheel would be greatly diminished, even with a greatly increased weight of car-body. The height of the car would be increased two feet or more, without any great increase in the weight per seat. The windows could be raised thirty inches instead of twelve. By increasing the length of the car-body considerably, the space over the trucks would be available for lockers, wash-rooms, etc. The plan has of course no particular advantages for an ordinary day-car, and is certainly objectionable for general use; but in certain cases where very easy, large, and heavy cars are desired, the plan, properly elaborated, would have at least all the advantages we have named, as well as some others which will occur to practical minds.

Interchange of Cars.

THE following rules for the interchange of freight-cars were adopted at a recent meeting of the Southern Railway Association, an organization consisting of some fifty railroad managers, representing about 6000 miles of road:

1st. Each road should keep a car inspector at all transfer or junction stations, and reject all cars that are not in safe running order.

2d. If cars are out of repair, but still in safe running condition, and loaded with freight that should not be transferred, they may be received, after being marked and noted by the inspector in such a manner that the car may be received back in the same condition ordinary wear and tear excepted.

3d. When foreign cars are broken, they shall be made good by the road on which they are broken, except as hereinafter provided.

4th. The road breaking the car to have the option of repairing it, or allowing the road owning the car to repair the same at their expense, it being understood that they shall make the car as good as when they received it, ordinary wear and tear excepted.

5th. When a car is broken so as to require a new body, the road on which the accident occurs will settle with the owner of the car, by paying the value of the same, at the time the accident occurred; or if requested by the owner thereof to rebuild the car, shall do so, the owner paying the difference in value between the new and the old.

6th. In case of breakage of wheels or axles, or renewals of brasses in ordinary usage, the party owning the car will furnish the necessary wheels, axles, and brasses, to replace those broken or worn out, without charge. But the road on which the damage occurs will furnish the labor, and make the other repairs incident to such breakage.

7th. In case new brasses are furnished by the company on which it becomes necessary to renew them, they shall be charged by the company putting them in at thirty-five cents per pound and the old brasses shall be credited at half-price.

8th. In the absence of specific agreements, a charge of one and a half cents per mile each way, both loaded and empty, is recommended as the proper mileage for freight-cars run on foreign roads.

Novel Lubricant for Journals.

MR. ALBERT BRIDGES, of New-York, the well-known railway supply manufacturer, has recently patented a powder lubricant for car-journals and other bearings, which is found upon trial to possess invaluable qualities for counterbalancing friction and preventing hot bearings. It is a fine white powder made from a mineral of talcose magnesian character, and free from grit. It is mixed with oil into a paste, is easily applied to shafting or car-journals. New car-journals packed with this paste can be put into immediate use, without fear of heating. The patentee states that many delays can be prevented by carrying the paste on the train *ready for immediate use;* as soon as a hot journal is discovered, apply the paste to the journal as directed, and there will be no necessity for delaying the train to cool off and repack the journal. If the journal is very hot, it may burn out the oil with which the lubricant is mixed; but it will not destroy in the least the anti friction properties of the *lubricant,* which is perfectly *incombustible.* On steamer journals and other heavy bearings, this lubricant has been found very efficient in preventing the heating of the surfaces where every thing else has failed. Those who have trouble with hot journals had better make application to Mr. Bridges, who will supply the article, and full directions for use.—*Railway Times.*

Uniformity of Truck-Fixtures.

WYANDOTTE, KANSAS, August, 1872.

EDITOR OF THE NATIONAL CAR-BUILDER.

DEAR SIR: Among the many important topics discussed at the late meeting of the Master Car-Builders' Association, there is none which, in my judgment, is entitled to more serious consideration than that of uniformity in those parts of car-trucks requiring most frequent renewal. These include axles, wheels, oil-boxes, journal-bearings, and the various castings used. Any one who has any thing to do with the management of railroads, and the construction and repair of rolling stock, must be aware of the great variety of patterns and sizes now used, and the great inconvenience resulting therefrom, involving in the aggregate a vast and unnecessary expenditure of time and labor, especially in the matter of repairing. The evil increases with the increase of traffic and the extension of our railways, year after year, until it has acquired such magnitude as to render necessary some concerted action in the way of applying a remedy, so that in future it may be materially diminished, if not overcome altogether. In order to secure the adoption of some effective means to bring about a result so desirable, the attention of railroad men of every class must be directed to the subject to a greater degree than it now is, embracing not only those who are connected with the mechanical departments and general management, but stockholders and others who are more especially interested in financial results and dividends. And not only these, but the great bulk of the traveling and business community are directly concerned in the arrest of an evil which affects their well-being in one way or another more than they are aware of.

Perhaps there is no better way of attracting attention to this subject than by a brief statement of some facts within the personal knowledge of the writer, who has had many years practical experience in the construction and repair of passenger and freight rolling stock. A Western road with which he was connected had their passenger-cars from seven, and their freight-cars from twelve different manufacturers. The axles under these cars ranged from 6 ft. 5½ to 6 ft. 10½, including five different lengths, and weighing from 260 to 370 lbs. The wheels weighed from 446 to 552 lbs. The diameter of journals varied from 2½ to 3½ inches, and seven different kinds of bearings were used. Five kinds of oil-boxes were required for the freight-cars, and different ones also for the passenger-cars, to say nothing of an endless variety of castings and patterns necessary to replace such as wore out or broke in the running.

It may be remarked also that of the numerous parties engaged in the building of all classes of cars, none have any standard for axles, oil-boxes, bearings, or castings. They build to suit this or that individual or road. One wants this, that, or the other length of axle, size of bearing, pattern of casting, and so on, each according to his peculiar notion or caprice; a car for so much money, to fill a contract perhaps, little caring for any thing else, so it is a car, and regardless of the expense and inconvenience entailed on the road or company receiving it. Aside from the regular car manufacturers who employ millions of capital in their business, there are no less than four hundred railroad companies, scattered from Maine to California, who build and repair cars. The larger portion of these have their own standards for axles, journals, etc., while many have no standard at all; but use a little of this size and a little of that length, a little short and a little long, a little light and a little heavy, any thing to keep up repairs and satisfy present needs, so the machine can be kept moving and not come to a dead stand-still. It is difficult for any one not actually engaged in the moving, repairing and handling of cars at the great railway centres, to form any adequate idea of the difference in cars belonging to different roads. It is a rare thing to witness even an approach to uniformity in the running-gear. All are more or less different in the essential details of the truck; and in case of breakage of any part, there is no end of vexatious delay caused by not having an axle long enough, or a bearing that will go into the oil-box, or an oil-box that will fit the truck, or some other thing of a certain size that is not exactly the size that is wanted, and consequently useless for the present emergency. The cost of these delays, especially in the case of perishable freight, and other instances that might be named, is more than the cost of a car, affecting as it does directly and remotely a great variety of interests.

Without dwelling further on the points above referred to, it must be evident to any one who will give the subject a little reflection, that a reform is not only necessary, but it must be begun at once in order to check the growing evil and in due time eradicate it. It is not, of course, the intention of those who advocate this reform, to discard the axles, bearings, etc., now in use, but to determine in some satisfactory way what shall be recognized as the best standards, and that these standards be adopted and adhered to in the construction of cars in future. Half the cars now in use will be worn out in ten years; and in twenty years at the furthest, all of them will be out of existence, with the running-gear now under them. With the old, expensive, and annoying system out of the way, and superseded by a new one in which regard is had to uniformity in details, millions will be saved annually to the great business community. Time will be required to accomplish it; but the reform once begun, will commend itself to every railroad man and demonstrate its own utility. It will prove but another stage of progress in the great railway system, as inevitable as those that have preceded it. Look at the cars of thirty years ago, and compare them with those of to-day as respects every detail of construction, and the change is seen to be a radical one, surpassing any thing that could have been imagined by the most enthusiastic dreamer of the olden time; and just so surely will the time come when the present confusion and diversity in the running-gear of cars will give place to uniformity and recognized system. J. S.

Refrigerator-Cars.

THE Chicago *Railway Review* contains the following in regard to the refrigerator-cars used for the Blue Line freight of the Michigan Central Railroad: This line makes the shipment of fresh meats, butter, etc., to the Eastern cities, a specialty during the summer months, and uses refrigerator-cars both of the Davis and Sutherland patents. These, says the *Review*, are, without doubt, the best of the kind. The outside does not differ in appearance from other freight-cars, with the exception of not having end windows and grated doors, and they are a little heavier. The Davis cars, which we examined, had been running about five years, almost exclusively in the beef trade. The floor is double, with heavy matched flooring; the sides are made air-tight with a lining of zinc, which stands off six inches from them, this space being filled with ice and salt, the ice broken in pieces about the size of an egg; the doors are of the same thickness, are double and open into the car; the space within the doors is filled with charcoal and saw-dust; an additional door of plank is outside of this, and when the car is loaded the space between the two doors is filled with saw-dust. Fastened to the ceiling of the car with staples are iron rods, about ⅝ inches in diameter, placed about one foot apart, longitudinally, from which the meat is suspended by means of hooks. A car will carry about 120 beef-quarters, weighing in the aggregate from 16,000 to 20,000 lbs. A wooden rack extending about the sides of the car prevents the meat from swinging or resting against the zinc. The Davis car requires about four tons of ice to render it a perfect ice-box, and this is replenished at Detroit, Suspension Bridge, and Albany, and meat shipped in this manner brings the highest price in the Eastern markets.

The Sutherland car is built with packed sides of charcoal and other ingredients, to render it impervious to atmospheric influences. The casing is about six inches thick, and the interior lining is of zinc, the same as the Davis car; the ice is placed in a rack at each end of the car, and above the racks are openings in the roof to replenish the ice; a door drops from the roof of the car to the edge of the rack, which serves to retain the ice in its place; a conduit-pipe carries off the water, none of which is allowed to stand on the floor. A rack will hold 1½ tons of ice, or 3 tons to the car—one ton less than is required by the Davis method, and without the extra trouble of breaking it into small pieces. The Sutherland car shown to us was used for shipping butter. The kegs and firkins are piled up two thirds the height of the car, between the racks; the doors are closed in the same manner as in the Davis cars, and the ice is replenished at the same points.

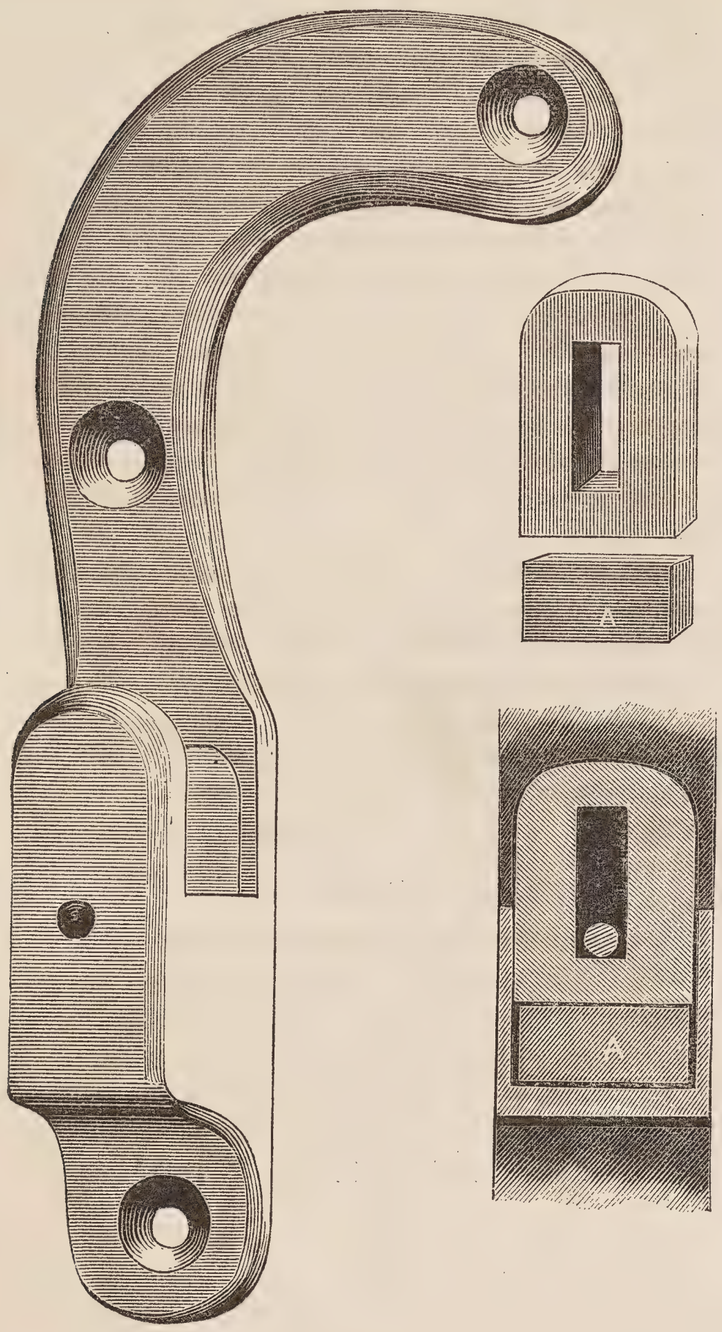
The additional expense of running a refrigerator-car from Chicago to Boston is about $30, and rates are the same as with ordinary freight-cars; the shipper runs no risk; if his goods are in perfect condition when loaded, he can rely on finding them so when unloaded. And in regard to beef, he pays rates on that which is clear profit to him, without the extra freight on horns, hide, and hoofs when live cattle are shipped.

American Timber Interests.

"WE are threatened with a want of sufficient quantity of timber to meet the actual necessities of life. Twenty million people are living in dwellings chiefly constructed of wood; their barns and outbuildings are of wood; the fencing of their farms, more expensive than their other improvements, is of wood; and all these are perishable with time. Moreover, our sixty thousand miles of railroad consume annually immense quantities of timber. Twenty-one thousand six hundred cords of wood are daily consumed in running railway trains three hundred and twenty thousand miles each twenty-four hours. Sixty thousand miles of road require twenty-five hundred ties to the mile, and, as they must be replaced every five years, an annual consumption of thirty million ties is required. We will soon construct each year ten thousand miles of new road, requiring twenty-five million more ties, and when we add to all these sources of forest destruction the wood required in the fencing of these railroads, the half-million telegraph poles which each year will be required, and the vast amount of the destruction of forest by flood and fire, we must be absolutely startled with the conviction that whole provinces of woods, which have required a hundred years to grow, are each year being swept away, while nothing is done by either public authority or private zeal to supply the place of that which is destroyed, or protect in any measure that which exists."

These are "hard facts," and whether people mind them or not to-day, they will give them some thought hereafter. In France, the forests were cut down with the utmost recklessness, and for the last thirty years her fertile valleys have been swept by terrible floods, carrying away all kinds of property, and covering the rich soil with gravel and sand. In Russia, the forests are beginning to disappear, and a law is now in force making it illegal to use any thing but coal for fuel on the railroads. The timber lands of Germany are under the special protection of the government; while in Japan, every one who cuts down a tree is compelled at once to plant another. The experience of these countries foreshadows that of our own. Thoughtless men and reckless corporations may go on stripping the land of its forests, but at last every one will be convinced of the necessity of a change.—*Exchange.*

TWO new and strangely constructed locomotives have recently been put in use at Connellsville, Pennsylvania, for regulating purposes, or for making up trains. These locomotives have bumpers on both ends, the tender is done away with, and water is carried in a tank placed over the boiler. The fireman's foot-board is so made as to hold sufficient fuel for several hours' consumption.



Improved Seat-Iron Rest.

THE engraving illustrates an improved rest or hook, as it is sometimes called, for car-seat back-irons. The design of the improvement is to break the force of the blow when the seat is reversed. This is accomplished by a box or cavity in the hook, at the bottom of which is placed a piece of rubber A, and above this, and resting upon it, a metallic plunger, held in its place by a pin passing through an oblong slot which gives the plunger room for the necessary action when the weight of the back iron falls upon it. The utility of such an improvement will be readily understood and appreciated by the traveling public, as well as by railroad men. The improvement has been patented. Orders for same may be addressed to Vose, Dinsmore & Co.

Freight Signal-Rope.

How many accidents occur from trains breaking apart, the engineer not being notified of the fact, is well known. There has long been needed some connection throughout the train more effective than the old-fashioned bell-rope, which, though perhaps sufficient for passenger-trains, is not applicable to freight. A recently patented "train-telegraph" would seem to supply the want. In one corner of the caboose is a battery, differing from common telegraph-batteries in being constructed of leather and copper, and being closely boxed, connecting with an alarm in a small box on the side of the caboose, and with another on the engine; wires run beneath all the cars, and the connection is established between the cars by flexible copper wires, covered, which can be detached, being held in their places by any simple spring or catch. When the train breaks, these cords are unfastened, the connection is broken, the alarm is sounded in the caboose and the engine, and the train is stopped. This is the principal object of the invention; but by means of it, the conductor can, by simply moving a key of the alarm-box, signal the engineer to back, go ahead, etc. A thorough test of it has been made by practical railway operatives and managers, and the results are pronounced eminently satisfactory.—*Pittsburg Commercial.*

Car-Shop Book-Keeping.

BY W. E. PARTRIDGE.

THOSE who seek for facts relative to the building of railway rolling-stock are frequently aware of the lack of precise and reliable information among car-builders. This want of definite knowledge is especially manifest as regards time, labor, and material expended upon any particular job or piece of work. The cause is mainly to be found in the want of a proper system of recording facts when they are at hand. Ordinarily, the business man finds a system of book-keeping ready made to his hand, and requiring but slight modification to adapt it to his special needs. But the master car-builder finds that if he wishes to record the results of his experience in the building of each lot of cars, he must invent a system for himself; and in order to have it embrace all he wishes, it must necessarily be somewhat complex. Such a system can hardly be completed in all its details by any one person. The devising of the general outlines is a task few would care to undertake, even if they possessed the ability to perform it. The development of the details must be left to the particular requirements of each shop.

Having made some notes several weeks ago relative to the system devised and in use by Mr. W. E. Chamberlain, master car-builder of the Boston and Albany Railroad shops at Allston, Mass., I take the liberty of herewith presenting them to the readers of THE CAR-BUILDER. The system, in its practical operation, has given the most satisfactory results, and is worthy the somewhat detailed description we give of it.

In order to secure a proper distribution on the different jobs, the time is kept by the hour. Each man's name is on the time-book, while the time itself is kept on a loop of paper slipped over the outer half of the leaf. By turning inside out, this is made to last four days. The job upon which the man is engaged is noted with his time. The time is transferred from this book to a time-ledger, where it is distributed among the different kinds of work, such as new passenger, new freight, passenger-car repairs, freight-car repairs, coal and dump repairs, etc. At the end of the month, a return of all time is made upon a distribution-sheet, which is filed away. The totals from this sheet are then entered in the day-book, which book shows all the material in detail in a car, or number of cars, also all time and all cash expenditures. The invoice-book contains the account in detail of all material purchased and from whom.

The bills against the shop are all made out upon blanks furnished by the master car-builder, and no bills are paid if presented in any other form. This makes them very convenient for filing, the size of the paper being uniform. Requisitions are all made out upon regulation forms, and then copied into the proper books with an ordinary letter-press. Of these books there is a series of four, namely, "Castings," "Wrought-Iron," "Lumber," and "General." All orders from headquarters relative to the building or numbering of cars are kept in a book by themselves. All letters written are copied in the usual way, and all letters received are either pasted in a stump file, or laid out flat, address uppermost. When a correspondence becomes voluminous, the latter plan becomes preferable, although there is more chance of a letter being mislaid or lost.

Another feature of this plan is exceedingly valuable, as all will admit who have been obliged to search in all directions for the address of some manufacturer, with whom they wish to communicate. This feature is the preservation in a scrap-book of all circulars received, those relating to tools being kept by themselves. All newspapers are filed, and all photographs of machines, cars, shops, etc., are either framed or placed in portfolios.

The foreman of each shop has a book in which entries are made of damages done to cars coming in for repairs, and by whom. These books contain the entire history of such cars. A truck-book is also kept, and contains in like manner the history of the trucks repaired, showing what has been done in the way of putting in new springs, axles, boxes, etc. Each axle being numbered, a record can be kept of the life of each one from the date of its going under the car until it comes out. A special book contains the mileage and history of the new Washburn steel-tired wheels, which are now being tried by the road. Special items are made of all repairs on time freight lines, and entries are made in a way to give easy access to them in settling accounts.

The intent and aim of the whole system is to preserve, under suitable headings, all information that is of value to the road, or that is likely at any time to be wanted.

How to Remedy a Break-Down.

SOME weeks ago, while looking through the shops of the Boston and Albany road at Springfield, we noticed a specimen of extemporized motive power which displayed in its construction and application a good deal of quick and accurate work, as well as rapid designing. Some time before our visit, the main engine, which drives all the machinery, suddenly broke down, and brought every thing to a stand-still. To meet the emergency and restore the lost power, something had to be done at once. An old hook locomotive, built by Hinkley & Drury, was taken from the yard, where it had been used for shunting, and brought into the machine-shop. The forward end of the smoke-box was taken off, and the valve-chests and steam-pipe exposed. In the mean time, the rear of the engine was jacked up and a solid drum of wood was bolted on to one of the drivers to serve for a pulley for the main belt. While this was being turned off, five-inch steam-pipes were laid from the boiler, which was about 150 feet distant. Connections between this pipe and the two steam-chests were then made in the smoke-box, the engine being connected inside. In less than forty-eight hours after the break-down, the shops were started with the locomotive. The cylinders are 16x20, and although their distance from the boiler renders about ten pounds extra pressure necessary, the extemporized engine seems to perform its work with even greater steadiness than the old one. A Huntoon governor was subsequently put on, waste-pipes connected with the cocks in the cylinder-heads, and various other little matters of convenience attended to. The exhaust-nozzle was removed, and the pipe carried directly up through the roof.

Such a feat is one not often accomplished, and should not be undervalued. The saving in expense is of course very considerable. The credit of this ingenious adaptation of means to ends is due to the master-mechanic of the shops, Mr. Wilson Eddy. The old engine is to be replaced by a new one of Green's patent, built at Hartford.

Marchand's Car-Coupler.

A TRIAL of this device was recently made on the Alleghany Valley Railroad, on a level track, on gradients, and on a curve of 100 feet radius, with a train of 35 loaded cars. A number of road officials were present, and others interested in the success of the coupler, which was subjected to every test that could be devised, and afforded the highest satisfaction to experts and all who observed its action. It acts automatically in connecting cars. Connection can be broken by a simple movement. The train in question coupled itself with cars while running at a high rate of speed around a short curve, a fact which secured for it the good opinion of all present.

AMONG other reforms which are proposed by the new management of the Erie Railway, a contemporary states that the long-talked-of scheme of putting down a third rail so as to have the common gauge of 4 feet 8½ inches, is to be carried out by the new managers. The broad gauge will be continued for the present rolling stock until it is worn out, but all new cars and locomotives will be built of the narrow gauge.

Car-Shop Notes.

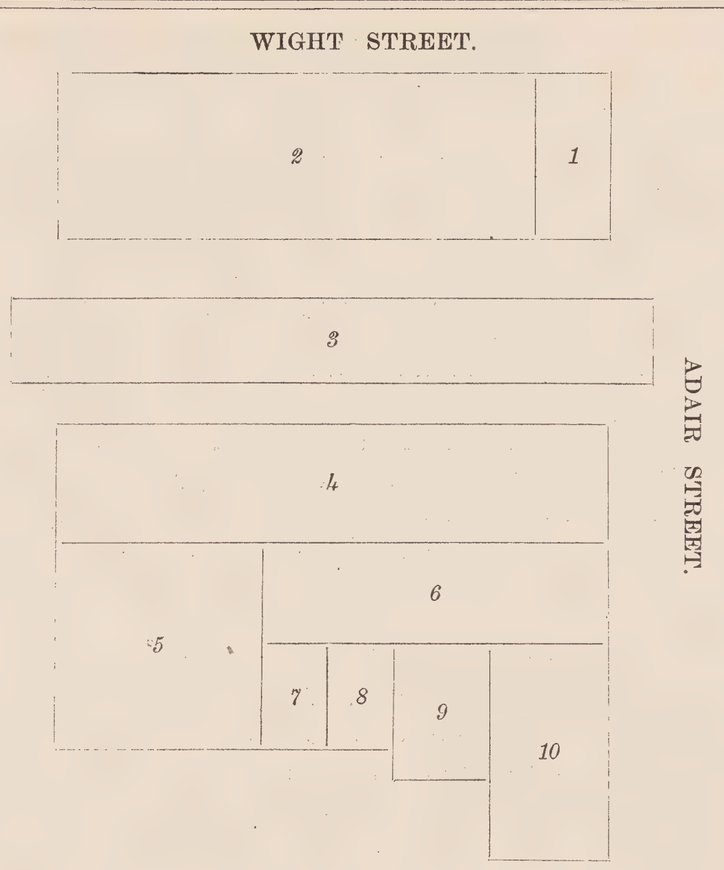
THE NEW DETROIT CAR-WORKS.

In a brief notice of these works, in a recent number of our paper, we promised a more particular description of them as soon as the necessary information could be obtained by a personal inspection, which promise we are now able to fulfill. Although the works are new and have just begun active operations, the leading members of the company which constructed them have been the pioneer car-builders of the North-west. They were the original founders of the old Croghan street works in Detroit, and built the first cars that were turned out by contract in Michigan. About five years ago, a company was organized under the name of "The Detroit Car and Manufacturing Company," whose works were situated on Croghan street, and of which Mr. J. B. Sutherland was general manager. The controlling interest in these works was transferred, about two years since, to the Pullman Palace-Car Company, the effect of which was to leave the original owners "out in the damp;" but their indomitable energy and spirit were not destined to be extinguished at that stage of the game. They set to work, and about six months ago, completed the organization of the "Detroit Car-Works," the location and capacities of which we now propose to give some account.

The first thing to be done, was to procure suitable grounds for the erection of shops, and devise plans for the same. A very desirable location was obtained on the corner of Wight and Adair streets. The whole area of ground now controlled by the company, comprises thirteen acres, extending from Wight street to the Detroit River. The seven acres contained in the original plot are now occupied principally by the buildings, the remainder being used for a lumber-yard. In this location a good dockage is obtained, which is very desirable, as a large proportion of the lumber used in the construction of cars is obtained by water from the lumber districts of Michigan, and other sources. The cars can be shipped by water from the slip or dock, on to one of the railway transfer steamers, of which there are two at Detroit, and landed at any one of the principal railroads leading out of the city. Another outlet for shipping cars will be by a track from the shops down Wight street to the Lake Shore and Michigan Southern, and Detroit and Milwaukee railroad depots. This track is not yet commenced, but the building of it is a matter of certainty. It will readily be observed that the principal points have been gained, namely, an advantageous situation for the shipment of cars, and the receiving of material for their construction. Another very important feature is the facilities for conveying materials from shipboard. A track is laid on the dock in close proximity to the vessel, by which lumber, etc., can be taken directly from it to the hand-trucks or cars, and conveyed to the transfer-table, and from thence to any part of the shops where needed for immediate use; or, by numerous turn-tables and tracks throughout the yard, lumber can be piled up for future use.

The construction of these shops is in almost every respect a model worthy of imitation. The general plan is a combination of ideas derived from a careful examination of the best shops in the country, and from a large experience in the management of similar works. Many defects have thus been discovered and the remedy applied. We do not by any means wish it to be understood that the Detroit Car-Works are the best, largest, and most expensive in the country, which is far from being the case; but as regards general facilities for construction, with judicious and economical use of means and saving of labor and time, they are not excelled by any others that have come under our notice. The following diagram and references show the relative position and size of the different departments.

The part of the building used for office and store-rooms is two stories high, the store-rooms occupying the first floor, and arranged with special regard to the



1.	Offices and Storerooms—2 stories,	73 × 21
2.	Passenger Car Shop,	73 × 198
3.	Transfer Table,	35 × 243
4.	Freight Car Shop,	42 × 216
5.	Wood Machine Shop—2 stories,	90 × 80
6.	Iron Machine Shop—1 story,	40 × 126
7.	Wheel and Axle Room,	40 × 30
8.	Engine Room,	40 × 20
9.	Boiler Room,	48 × 38
10.	Blacksmith Shop,	96 × 36

easy handling of their contents. Shelves, drawers, cupboards, pigeon-holes, etc., are provided, so there is a place for every thing, and articles can be dealt out with the least possible trouble or delay. The office-rooms on the second floor are not yet completed, but from present appearances they will be all that could be desired; and among other advantages, affording a view of the whole establishment from the south and west windows. In the passenger-car shop there is room for eleven coaches or twenty-two freight-cars. Between this shop and the transfer-table is a space of 21 feet, upon which an ordinary freight-car can be run in case the other tracks are occupied. A space of six feet intervenes between the pit and freight-car shop. The doors of these two shops are made to slide, which is preferable to the general rule of swinging them outward. In the freight-car shop is room for the construction of twelve cars at once. The wood-machine shop is the only part of the buildings that is two stories, excepting the office. On the first floor is placed the heavy wood-working machinery, comprising Daniels planers, surfacers, matchers, mortising, tenoning, boxing, shaping, and moulding-machines, and saws from the heavy railway cross-cut to the finest scroll-saws. Leading into this shop are two tracks from the lumber-yard, on which material can be conveyed with but little handling. On the second floor is located the light machinery and benches used for doing the cabinet and other fine work for passenger-cars, etc. In the iron-machine room there is a good selection of machines adapted to the work to be performed, such as planers, lathes, punches, bolt-machines, and drills; also a new device called an arch-bar drill, used for drilling the holes in truck arch-bars, and by which the six holes are all drilled at once, and as quickly as one hole can be by the old method; also the laying out and centre punching for the different holes are obviated. A small machine was noticed which is not found in every shop; it is a nut-tapper, upon which three nuts, all of the same or of different sizes, can be tapped at once. One very essential point worthy of notice here is the placing of the different machines, both wood and iron-working, in such a manner as to allow sufficient space for handling material without interfering with each other. In the wheel and axle-room every thing is in perfect order. The wheel-press is placed in the centre of the room. After the wheels are pressed on to the axle, they drop on to a track directly under the press, and are then run into the freight-car shop, or, if not needed immediately, run out into the yard. The axle-lathes are on one side of this track, and the wheel-drills on the opposite side. When an axle is finished, it can, by a very ingeniously devised crane, be thrown directly into the press; the wheels are also handled in the same way, thereby doing away with a great deal of heavy labor. Next to this is the engine-room, without which all the others would be useless. A Lane & Bodely engine, of 150 horse-power, does this part of the work, and is connected to the main shaft by a 27-inch belt. Adjoining this is the boiler-room, containing three boilers, with capacity to generate more steam than can possibly be used; but this is no defect. Last, but not least, is the blacksmith-shop, in which are now twelve fires and a power-hammer. All the machinery in these shops was purchased through the agency of the well-known firm of C. S. Wormer & Son, Michigan machinery depot, and is first-class in every respect. The roofs of the erection-shops are flat, and numerous sky-lights are placed at regular intervals to give uniform and sufficient light throughout the buildings.

Enough has been said to give the reader an idea of the capacity of this establishment. We noticed but one thing to which any exception could be taken, and that is, the tracks in the shops are of wood, and are laid on the top of the floor, which is objectionable from the fact that nine times in ten it requires double the number of men to push a car on wooden rails that it does on iron, besides the extra amount of ill feeling wrought up, and "cuss words" used. The extra labor for that one item would more than pay the difference in the original cost of iron and wooden rails. Experience has proven very clearly the economy of iron rails for shops, and that the top of them should be flush with the floor.

The works are under the general management and supervision of Mr. D. Sutherland, formerly master car-builder of the Buffalo shops of the Lake Shore and Michigan Southern road, and who is by experience and ability well qualified for the position he now holds. Our acknowledgments are due to him, and also to the secretary of the company, Mr. George H. Russel, for their kind attentions during our recent visit to the works and for the information herein embodied.

THE MICHIGAN CAR COMPANY.

The works of this well-known company are situated one square north of the Michigan Central Railroad passenger depot and shops. The buildings occupy about two blocks in a populous and compactly built portion of the city, which, to say the least, is not a favorable location, considering the large and rapidly increasing business of the company. The large quantities of car material piled along the streets outside of the works are an evidence that the business at present transacted has outgrown the space originally allotted to it. This inconvenience, however, will not continue long, as new works on an extensive scale are now being constructed in a more desirable locality.

We proceed to notice briefly the old works. Most of the machinery, together with the blacksmith-shop, offices, and store-rooms, are in a large brick building, which, according to appearance, is one of the old landmarks of Detroit. On the opposite side of the street are the erection-shops, which are numerous, additions having been made from time to time as the requirements of a growing business demanded, until the entire available space has been occupied. On the second block below are the lumber-yards, containing about eight million feet of lumber, including the various kinds used in car construction, among which may be mentioned some three million feet of Michigan pine.

When the limited space occupied by the shops is taken into consideration, and the necessarily crowded condition of the machinery and fixtures, a casual observer would be surprised to learn that their capacity is equal to the turning out of ten freight-cars per day, and this without working more than ten hours, and

with an average force of 450 men of all grades. This is the result of thorough organization and excellent management. Order and system are apparent in every department, and every class of employees have their work well in hand. At present, no passenger-cars are built at these works, for the reason that their facilities are better adapted to freight-work, and the orders for this class of rolling stock are more than equal to the capacity of the works to execute. The cars built by this company are to be seen on all the leading lines of road, and especially on the various lines between Chicago and New-York. In passing through Toledo recently, we noticed a freight-train of 35 box-cars belonging to nine different roads, and 21 of these bore the brand of the Michigan Car Company. These were not new cars, nor did they all belong to one line of road. While in the shops, we noticed cars in process of construction for the Blue Line, Detroit, Eel River, and Illinois Railroad, and the North-American Rolling Stock Company; and in addition to these, the company have numerous contracts ahead.

As the operations of the company will, before a great while, be transferred to their new works, now in the course of construction, we deem it unnecessary to give a more particular description of the old ones. The new buildings will be on a mammoth scale, and in all respects adequate to the requirements of the present business of the company, with a margin for its future increase. They will occupy an area of fifty acres in the suburbs of the city, at the junction of the Michigan Central, Grand Trunk, and Lake Shore and Michigan Southern Railroads. A portion of the new paint-shop is already finished, and the cars as fast as completed are brought here from the old works to be painted and got ready for shipment. The other shops will be completed early next spring. According to the plans, the capacity of the new works will be 16 freight-cars per day, and the same number of passenger-cars per month.

We hope to be able in a future number of THE CAR-BUILDER to give a particular and detailed description of the new works. In the mean time, we conclude our present notice by acknowledging the polite attentions of Mr. James McGregor, the efficient and capable superintendent, in affording us the information herein contained.

OLD COLONY AND NEWPORT RAILROAD SHOPS.

These shops are situated on the line of the road very near Boston, and scarcely a mile from the depot. Mr. A. Gleason is the master car-builder. The standard passenger-car he is now building, is 50 feet long by 9 feet 6 inches wide. The bottom framing is of the crosswise description, 35 cross-sills being used; but there is no cross-trussing of any kind except 21 three-quarter-inch rods from side to side. The side-sills are 5 by 8½ inches. No longitudinal truss-rods are put under the cars. The truck is a very good one, and a great favorite in New-England. It has a long link swing-beam with Vose, Dinsmore & Co.'s volute springs on the equalizing bar, and a rubber spring on the beam. A strip of ⅝ sheet-rubber is put under the bar and over the box to deaden the jar, the strip being 9 by 10 inches, with a 2-inch hole. The link in this truck is set in the middle of the two cross-beams.

Mr. Gleason seals up under his cars with inch and a quarter hard pine. The under floor is inch pine, and the upper floor scant inch. In the aisle of the car, the floor is laid of hard pine with black-walnut alternating, which makes a very neat and pretty floor. The truss-plank is halved on to the posts half an inch deep, and screwed fast with No. 20 wood screws. The great width of these cars allows a great thickness in the walls. The posts are 1¾ by 4¾, which makes the thickest car-wall that we have seen. This gives certain advantages in construction which are not to be despised, and it also gives a broad window-ledge for an arm-rest. These 50-foot cars seat 66 passengers. Mr. Gleason's method of putting his roofs together deserves some mention. His first step is to frame the sides of the monitor or raised deck; these extend from end to end of the car, forming in effect two trusses 50 feet long. After these are finished, the remainder of the roof with its six iron carlins is framed to them. The whole roof is then hoisted into place, and bolted down between the windows with ⅝ bolts. There are 40 windows in one of these cars—glass 20x26. Instead of an iron hood over the platform, the whole roof of the car is curved down so as to somewhat resemble a canal-boat's bow when inverted. This finish is neat, and it is said that the sparks fly upward from it better than from a hood. The transoms are of iron and wood—four iron ones, each 6x⅓ inch; the wooden ones, 6x4 inches. The long wooden rafters are 1½x1¾ inch; the short ones, 2¾x1¾. The outside plate, instead of lying flat on the posts, is placed edge up. The panels (⅝ lbs.) are all glued on to both posts and furring.

As a sort of experiment, the road is building a lot of six-wheeled flat-cars. So far, they have worked very well, and are a little cheaper than a long car.

The following average weights of the various kinds of cars on this road will be both interesting and valuable:

Passenger-cars, 66 seats	35,350 lbs.
Baggage-cars	29,550 "
Coal dump-cars	7,760 "
Long flat-cars	14,000 "
Long box-cars	16,300 "
Six-wheel flat-cars	10,500 "
Gravel-cars	5,800 "
Four-wheel flat, (average)	4,950 "

THE BOSTON AND ALBANY RAILROAD SHOPS AT ALLSTON, MASS.

This company have recently completed their new shops at Allston, on the line of the road near Boston, which will relieve to some extent the overcrowded shops of the road at Springfield. Although the new works, owing to the bad location necessarily chosen, are long and narrow, they are well planned. It was originally intended to extend two tracks lengthwise through the repair-shop, but a better plan was adopted by the use of a transfer-table running at the back of and parallel with the building. This table is constructed with a top mounted on six wheels set radially, in such a manner as to form a turn-table of the upper part of the apparatus on which the car stands. It will swing a car having a thirty-foot body, and by its use enables the tracks to be laid across the shop floors. It is almost unnecessary to say that, mechanically considered, this apparatus consists simply of a four-wheeled truck, upon which a turn table is mounted.

Aside from any merits in the appointments of the new shops, they possess a decided advantage in the fact that the workmen, having been gathered from all parts of the country, and never having previously been with each other, are free from the traditional ideas that in old and long established works tend to keep practice in ruts and oppose useful innovation, not less in shop discipline than in matters relating to methods of construction. The great length of the shops causes much time to be lost on the part of the superintendent, in passing from one department to another.

The works are run by an 80 horse-power engine, built by the Putnam Machine Company, and supplied with steam from two Hinkley boilers. The machinery embraces many pieces of heavy mechanism designed for special purposes, as well as the usual wood and iron-working tools, which in this case are fitted with numerous improvements in details, rendering them all, in fact, special tools. This was especially noticeable in the wood-working department. Of these, we have not space to speak at length in the present article, but the following notes of the quantity of work turned out by different machines will be of interest: In boring wheels, one man turns out from 30 to 33 per day, and in turning journals, 24 per day, or 12 axles, the tool going over the journal but twice, the first time taking off a cut deep enough to allow the finishing-tool to follow. One man cuts 88 ¾-inch bolts per hour, 154 ⅝-inch, and the same number of ½-inch. On the boring-machine, 125 safety-beams, 8 holes each, can be finished per day. Of transoms for iron trucks, 19 holes per stick, 100 is an average day's work; and 400 holes for transom truss-rods can be bored in a day. In February and March of the present year, the works were setting up four coal dump-cars per day.

The works having been but a short time in operation, the cost of setting up work can not be given with that certainty possible after longer experience from which to deduce a general average. We have the item of the cost of the last 25 coal-dumps, $7526. The average cost of setting up a truck, $1.25; at Springfield, the cost is about the same, the variation not being more than 25 cents. Formerly it cost the road about $7 per truck, because skilled labor was employed in it, the value of comparatively untrained labor, drilled in this particular branch, not being then understood, as the results above stated certainly show it to be now.

THE WILMINGTON CAR-WORKS.

Messrs. Bowers, Dure & Co., the proprietors of these works at Wilmington, Delaware, have recently erected new and convenient shops, and are crowded with work. Their working force is 170 men. They are now engaged on contracts for passenger-cars for the Lehigh Valley Railroad, six Pullman palace-cars for the Pullman Company, and a number of mail and baggage-cars for the North-Pennsylvania Railroad. They also have contracts for eight passenger-coaches for the Northern Pacific Railroad, and sundry narrow-gauge cars. The paint-shop has floor-room for twenty-one passenger-coaches. The erecting-shop is considerably larger. Between these shops is a transfer-table. The planing-mill and blacksmith-shop are in a separate building. The senior member of the firm, Mr. Bowers, was formerly in charge of the Harlan & Hollingsworth Company's works, and for several years was superintendent of the car department of the Philadelphia, Wilmington, and Baltimore Railroad. His experience and capacity have contributed largely to the successful and rapid growth of the business now done by the firm.

The Canada Car Company.

THIS company has been projected for the construction of all classes of railway-cars, to lease and sell, and to build by contract, according to the specifications of railway companies. As a rule, car-building companies in the Dominion purchase their axles, springs, etc., but the scope of the present enterprise embraces the manufacture from the raw material of all requisites for their completion. So promising does the enterprise appear, that the Toronto Steel-Works Company agree to hand over their works to the Canada Car Company, taking the price out in stock. We really think that there is room for a vast development of this branch of manufacture in Canada, where lumber is so cheap and yet where railway companies have to give contracts for cars to manufacturers in the States, simply because works of the kind in the Dominion can not nearly supply the demand.—*Canada paper.*

A Plea for Smokers.

AN exchange insists that the smokers, who form a majority of the whole population, have some rights of their own. Yet they are treated by all railway and steamboat companies as though they deserved to incur a penalty for every cigar consumed. On the railway, the smoking-car is usually the oldest, dirtiest, and worst in the possession of the company, and it is uniformly placed next to the engine or baggage-car, so that, in the event of a collision, the presumably worthless smoker shall have the first opportunity to be smashed. On most steamboats, instead of permitting men to smoke on the after-deck, they are banished to the extreme bow, whence their smoke is evenly distributed over the boat, while they run the chances of being trampled upon by horses and crushed by falling boxes.

The National Car-Builder,

PUBLISHED MONTHLY,

BY

VOSE, DINSMORE & CO.,

1 Barclay Street, New-York; 52 Fifth Avenue, Chicago; 713 North Second Street, St. Louis.

Terms, 50 cents per Annum.

Editorial Announcements.

Correspondence.—*We cordially invite the coöperation of the railroad public in affording us the material for a good mechanical paper. Articles relating to rolling stock and machinery, by those practically acquainted with those subjects, will be gratefully received. All communications must be addressed to Vose, Dinsmore & Co., No.* 1 *Barclay Street.*

The name and address of the writer must accompany all communications designed for publication.

Advertising Rates.—*For one square, or one fifth of a column,* $5 *per month, or* $50 *a year. For half a square,* $3 *per month, or* $25 *a year. Larger advertisements by special contract.*

All communications in regard to advertising should be addressed to L. F. Dinsmore, *Post-Office Box* 4055, *New-York City, who is our agent for advertising, and authorized to make contracts, collections, etc.*

Engravings and Illustrations.

We would invite the attention of Master Car-Builders and others to the advantages to be derived from publishing in The National Car-Builder *engravings designed to illustrate the various features and details of car construction, and especially such improvements as can not otherwise be clearly presented. We will procure cuts to be made in the best manner from drawings or models that may be sent us, and charge only for the cost of engraving, inserting the same in our paper with suitable descriptive details, without charge.*

India-Rubber Car-Springs.

Of the various uses to which India-rubber is applied, there are probably none in which it serves a more important purpose than in the construction of the car-truck. Its peculiar qualities are admirably adapted to the part it performs in sustaining heavy weights, while it retains its form and elasticity for a great length of time, under constant and continuous pressure. The material in its crude state, however, is of comparative little value until it has undergone a course of treatment which renders it vastly more serviceable for almost every purpose of utility, and especially as a resisting and supporting medium. This process consists in combining it with other and less costly ingredients in such a way as experience has shown to be indispensable in securing to the utmost extent the service required. Although this method of treatment is absolutely necessary and entirely legitimate, it is nevertheless liable to great abuse in the hands of unscrupulous parties. When it is carried beyond certain defined limits for the purpose of cheapening the manufactured article, instead of improving it, the process is no more nor less than adulteration in the worst sense of the term. An imposition is practiced on the buyer, who, in his eagerness to save a few dollars, gets what he bargained for without knowing it, precisely the same as if he had bought shoddy for cloth, or dye-stuff for claret; and the cheat is none the less for being sweetened with a low price. The general trade is demoralized, and the well-deserved reputation of a good article impaired just in proportion to the excessive adulteration and use of inferior gum.

A good serviceable rubber car-spring, such as a reputable manufacturer would be willing to brand and warrant, can no more be made of base material than a carriage-horse can be made out of a cart-horse, or Vermont maple sugar out of New-Orleans molasses. A cheap spring is necessarily made of cheap material, so that the price is an infallible indication of its quality. So long as the market price of crude rubber rules as high as it now does, and is likely to do for some time to come, the minimum price of a fair standard quality of spring can not fall below fifty-five cents per pound.

The first essential of a good spring is a suitable quantity of fine Para gum, pure and dry. A good quality of fine sheet Central American may be used with the Para in proper proportion. These will absorb a certain amount of dry white-lead and bolted whiting, but no more then is requisite. Sulphur is also used merely as a vulcanizing agent, its action being analogous to that of yeast in bread-making. There is a definite and fixed relation between the quality of the pure or crude gum and the quantity of foreign ingredients necessarily combined with it, not for the purpose of adulterating and cheapening, but to impart to the mass of material constituting the spring a body and solidity it could not have in any other way. The cheap springs offered in the market do not contain more than twenty-five per cent of good gum, the remainder consisting of coarse and inferior grades, with old rubber frequently mixed with it, and capable of absorbing a much greater quantity of adulterating material than good and fine gum. The tenacity, power, and durability of the spring are impaired just to the extent that bad material enters into its composition, and the foreign ingredients are out of proportion to the rubber. Springs can be made to weigh less by using less lead and more whiting, but the quality suffers in a corresponding degree, as the lead has a metallic and durable body, and the whiting a perishable one.

We are of the opinion that many car-builders, in cases where rubber springs are specified, run the risk of sacrificing a permanent advantage for a temporary and merely apparent one, by using cheap and inferior springs. The margin of profit on a contract may be increased a trifle, but, in the long run, the balance will be transferred to the other side. The cheapest is by no means the best. It requires but a very little figuring to form an idea of the extent of the adulteration of low-priced springs. Fine Para rubber is worth to-day eighty-five cents in the market, and fine Central American sheet rubber sixty-five cents, and the difference between these prices and the lowest spring quotations indicates very clearly the nature of the process by which low-priced springs are produced.

Bell-Ringing and Tooting.

Years ago, when railway statistics were in their infancy, a fast-moving train was a marvel to all beholders. It was a herald of progress embodied in visible and tangible form—a new power, the capabilities of which the most sanguine could form but a comparatively feeble estimate. The idea of swift locomotion caused all incidental disadvantages to be ignored or lost sight of. The exulting scream of the iron-horse was positively musical, as its piercing echoes startled the rural solitudes and reverberated among hills and valleys. Little heed was given by delighted passengers to such trifling annoyances as smoke, cinders, and dust, so long as they could escape from the discomforts of the old stage-coach. The steam-whistle intensified if any thing the zest of enjoyment and the pleasure of rapid transit.

This state of things, however, exists no longer. What was once a novelty has become so excessively commonplace as to be voted a nuisance, confirming the old truism that familiarity breeds contempt. Our large towns are many of them intersected by lines of road burdened with enormous and increasing traffic, their tracks open highways with numerous street-crossings at all sorts of angles. This, of course, renders necessary constant precaution against accident; and as no kind of warning is so effective as noise, the population of the vicinity are compelled to listen to a never-ending concert of tooting, bell-ringing, and miscellaneous clatter, all of which is sufficiently annoying in the day-time to sensitive nerves, and doubly aggravating during the night. The growth of this system has been so gradual and its necessity so apparent, that the public has learned to tolerate it; but had it been suddenly introduced, it would have been too much for human endurance. The evil is already a serious one, and daily becoming more so, and suggests the important question as to whether there is any practical remedy. A "committee on railroad improvements," in Boston, have offered $10,000 for an approved system of signals that will supplant the use of steam-whistles on railroads; but we fear the inducement offered, were it five times as much, would fail to secure the boon. There is, in our judgment, but one way of overcoming the difficulty to any considerable extent, and that is to make railroad tracks within the limits of large towns inaccessible to the public, by fencing them up, and having street-crossings provided for by means of bridges or tunnels, so that nothing can get on the track except what legitimately belongs there. This would of course involve great expense, and be attended with some incidental inconveniences, but it is nevertheless the only feasible plan, as it seems to us.

We see it stated that the managers of the Boston and Albany road propose to try the experiment of giving up the use of the whistle at crossings, except in the day-time where there is no flagman, or in cases where an accident is imminent to the train, or to persons or animals. As this road has a large number of grade-crossings, we can not but hope the experiment will be so successful as to induce other roads to adopt it.

Rapid Transit in New-York City.

The following particulars of the progress of the projected Underground Railway are furnished by Mr. Isaac H. Buckhout, chief engineer of the work, and formerly superintendent of the Harlem Railroad:

The route has been decided upon, and ground will shortly be broken at intervals of about half a mile along the entire line. The work will be vigorously prosecuted, and within two years from the present time, passengers will be transported underneath the most populous portions of the city. The depots will be about seven in number, and suited to the convenience and safety of passengers. The two tracks will diverge at the several stations sufficient to admit of a commodious platform between them, so that passengers going in either direction will not need to cross the tracks. The depots along the line will terminate at Fifty-ninth street, where there will be a large one to accommodate visitors to Central Park. The road will be connected with the Harlem track by switches at Fifty-sixth street, where the grades coincide. Its course from this point will be along Fourth avenue and the Bowery to Pell street, and thence to City Hall Park, where there will be a large underground depot. It will run beneath the surface throughout its entire length, and no viaduct will be necessary at any point. The cars will have side-doors with seats running crosswise, so that but little time will be occupied in the entrance and exit of passengers. The distance from the junction at Fifty-sixth street to the City Hall is about four miles, and the running time, including six stoppages, will be only about ten minutes.

Removal.

The Chicago branch office of Vose, Dinsmore & Co., has been removed from the temporary structure occupied since the fire, at 238 Michigan Avenue, to a more desirable location at 52 Fifth Avenue, (late Wells street,) where the manager, Mr. A. L. Butler, is prepared to execute orders as usual for the various kinds of railway car-springs.

Publishers' Notices.

ORNAMENTAL GLASS.—A recent visit to the manufactory of Mr. Thomas Jones, corner of Centre and Franklin streets, has enabled us to form some idea of the progress that is being made in this branch of the mechanic arts. For beauty of design and excellent workmanship, the various specimens of embossed and cut glass to be seen at the establishment of Mr. Jones will compare favorably with any that have yet been produced. The improvements in this manufacture have been steady and progressive, in accordance with the requirements of an increasing appreciation of what is really artistic and beautiful. There is perhaps no material better adapted to ornamental purposes than glass, nor any that requires more skillful manipulation in developing its capacities for varied artistic effect. In the construction of railway passenger-cars, especially, it is indispensable, and serves the purposes of both utility and ornament. Some new design in this branch of car decoration is constantly suggested by the style of construction and interior finish of first-class coaches, each an improvement on what preceded it in intrinsic beauty, or in more perfect harmony with its ornamental surroundings. This progressive feature is recognized by Mr. Jones in the practice of his art; and we take pleasure in calling the attention of railway men to his advertisement on fourth page of cover, feeling assured that they will be repaid by an inspection of the samples to be found at his manufactory.

VARNISH BRUSHES.—We invite attention to the advertisement of Mr. Charles D. Thum, of Philadelphia, on page 15. His brush manufactory is one of the oldest in the country, and turns out all articles in that line. He is the inventor of the *Half-Elastic Varnish Brush*, and makes its manufacture a specialty to which he devotes his exclusive attention. The merits of this article are recognized by car and coach-builders, cabinet-makers, and others, who use it in preference to any other. Mr. Thum refers to the *Coachmaker's Journal*, Pennsylvania Railroad and other leading roads which have used his brush with satisfactory results.

A NEW LUBRICANT.—We invite attention to the advertisement on page 15 of a new device for the lubrication of car-journals and other bearings, of which Mr. A. Bridges, the well-known dealer in railway supplies, 46 Cortlandt st., is the patentee. Its merits have been proved by practical tests of the most satisfactory kind, and we are assured that hot boxes are entirely prevented by its use. Samples are furnished to parties who desire to give it a trial.

KELLY'S LOCOMOTIVE HEAD-LIGHTS.—The Kelly Lamp-Works, at Rochester, N. Y., manufacture head-lights of every description, and of the most approved quality; also conductors' lamps and hand lanterns, with initials of roads and names marked on the glass. The Kelly Patent Head-Light is pronounced by numerous railroad officials the best burning and most brilliant light in use on our roads. See advertisement on page 17.

Miscellaneous Items.

THE Erie Car-Wheel and Car-Works now employ 450 hands, at a monthly expense of about $25,000. Their capacity is 100 car-wheels per day and from six to eight flat, gondola, and box-cars per day. They are now erecting a large foundry through which it is intended to increase their wheel product 250 per day, making 350 in all. This has been an extraordinarily successful enterprise, arising from the fact that none but the very best iron is used and none but the best wheels made, and the product meets with such high favor that the works will not be more than able to supply the demand after the new foundry is completed. Seven years ago, operations were commenced on eight wheels per day, and now the increase of orders demands an enlargement of the works to more than forty times its first capacity, showing what care, skill, and enterprise will do.

THE railroad-bridge which is to extend across the harbor of San Francisco from the main-land to Goat Island, and to which the citizens have been so strongly opposed, is to be somewhat of an architectural novelty. It is to run through an immense tube of boiler-iron, which supports itself in the water by its own buoyancy, and is held some 30 feet below the surface by a complicated system of cables, anchors, and buoys. The tube is 20 feet in diameter, and is strengthened by an internal framework of iron beams. The principal problem with the engineer was to have the buoyancy of the tube equal to the weight of a train of cars, so as to require the minimum of anchorage or support. Should the bridge prove a success, submarine railroad-tubes may become quite common, as they may be used where regular tunnels would be impracticable, or at least very expensive.

THE effect of railways in creating business and unfolding undeveloped resources is most strikingly illustrated in the business of locomotive and car-building at the present time. Manufacturers of rolling stock are overrun with orders, and the business is, notwithstanding the great advance in the price of iron, in a most flourishing state. All the great lines are crowded with freight fully up to and, in many instances, beyond their capacity. Many hitherto single-track lines are laying a second track to accommodate increasing business. The Lake Shore road is to be made a double track through its entire length. The Pennsylvania Central is rebuilding its eastern division, and on a large portion of the new road is laying a triple track This increase in traffic is chiefly confined to freights, and indicates a condition of general and almost unexampled business prosperity.

MR. HENRY DEITZ, General Supply Agent of the Atchison and Nebraska road, was recently presented with a costly gold chain and medal, by the employees in the shops and general office of the company, as a token of their appreciation of his services, and of their personal esteem and friendship.

THE works of Messrs. Frederick & Co., established in 1866 for the manufacture of railway-cars, castings, and forgings, are located on the Lehigh Valley Railroad, one mile below Catasauqua, Pa. Upward of 200 hands are employed, and the establishment is furnished with abundance of machinery and every appliance for enabling them to manufacture their products rapidly and on a large scale. They have two combination-planers, two mortising-machines, two circular saws, two boring-machines, bolt-cutters, and double nut-sappers, bolt-header, two saws, steam-hammers, etc. Their capacity of production is 250 to 300 coal-cars per month, or 100 horse or 200 gondolas.

A NUMBER of mail-trains proper are to be put on between Chicago and New-York. Cars are now building for this purpose, each fifty feet long and adapted for fast running. No passengers will be carried, and no stoppages are to be made except for coal and water, and it is intended that the distance, 962 miles, shall be accomplished in 24 hours.

THE Philadelphia and Reading Railroad Company are erecting in Reading a machine-shop 480 feet in length and 185 feet in width, all under one roof. The work on this huge building, the walls of which will be of brick, will be prosecuted rapidly, as the shop is to be completed in two or three months.

OF 487 railroads in the United States, 307 have a gauge of four feet and eight and one half inches, and the remaining 180 vary in gauge from three feet to six feet. Between these extremes, and including them, there are no fewer than eighteen other gauges operated.

THE machine-shops of the Atlantic and Great-Western Railway, at Meadville, are being pushed rapidly. It is expected that all the shops will be inclosed before November. The buildings will cover three acres of ground, and when finished and put in operation, will give employment to over six hundred mechanics.

THE largest driving-belt ever made in the United States is one recently ordered by the St. Louis Railway Supplies Company for the St. Louis Grain-Elevator Co. It is four feet in width, two hundred and eighty-six feet long, and weighs twenty-five hundred and twenty-five pounds.

THE North-Pacific Railroad has just closed a contract with the Baldwin Locomotive-Works, Philadelphia, for fifty first-class locomotives, which will be added to forty-eight already purchased, principally of the same works.

THE Central Railroad of New-Jersey is now one of the most complete and best appointed railroads in the United States. Its trains are fast, but they are always on time, and make sure connections. We are glad to note that the company have made arrangements to have Smith's Patent Steam Brake applied to all their passenger-cars.

A FACTORY is being erected at Fairfield, Ct., in which carriages are to be built consisting entirely of India-rubber, with the exception of the axles and tires—this material being claimed to possess decided superiority over wood.

THE Cumberland and Pennsylvania Railroad Company have received from the Harrisburg Steel-Works 250 tons of steel rails for their road. They are of the best quality, and when laid, the road will be supplied with steel rails for about two thirds of its entire length, and we understand the company design laying the remaining distance with the same substantial material as speedily as possible.

THE Chicago and Alton Railroad have just completed, and are now running, as day express on their road, one of the most complete trains in the world. It consists of a baggage and mail-car, 4 coaches, and a palace dining-car. It is equipped with Thornton's spark-arrester and patent dust-shield, Goodale's steam-brake, Creamer's safety-brake, Blackstone's patent platform and coupler, and Reniff & Buttolph's ventilators. The managers announce that the whole road will shortly be equipped in the same way.

THE Sultan of Turkey has just purchased for his individual use the train of eight sumptuous railroad-cars constructed for Napoleon III. some eight years ago. In 1854, the master of France sent his legions to the far East to save from disintegration the Turkish empire. Now the modern Cæsar languishes in exile, and the luxurious adjuncts of his once great estate are bought cheap by the weak sovereign whose tottering throne he planted on a firmer foundation.

Street-Car Motive Power.

THE latest novelty in the way of street-car motive power is now in operation on the New-Orleans and Carrollton street-railway. On a four-wheel truck about half the length of an ordinary passenger-car are a boiler, a tank, and a double cylinder engine of seven inches stroke. The tank is filled with about three hundred gallons of water. This water is heated at the depot in a stationary boiler, and discharged into the tank at the beginning of each trip. In this manner enough steam is provided to propel the car nine miles, and have a surplus of power left at the end of the trip. One man performs the duties of engineer, brakeman, and conductor. There is no escape of steam, nor any noise beyond that ordinarily caused in running a passenger-car, and a trial of nearly three months has shown this new motor to be not only practicable, but much cheaper than horse-power. The actual running expenses have been $1.48 per day.

A Boarding and Working-Train.

THE Canada Southern Railway Company are building a train for boarding and lodging gangs of men employed on their road. The dining-car is 60 feet long, 6 feet high in the centre, and 9 feet 6 inches wide. It contains four divisions, the first being the office of the man in charge of the department. It contains on one side three sleeping-berths, and on the other side office desks, and a cupboard. The next division is the pantry, fully fitted with presses and drawers, and close and ventilated safes. The third section is the kitchen, fitted with a large stove and every thing required in the culinary department. The fourth section is the dining-room, which will accommodate sixty at a time. The sleeping-car has a double row of berths down the centre of the saloon, three deep, and nine from end to end, thus affording sleeping accommodation for fifty-two men. The greatest attention has been paid to ventilation. A code of rules is placed in each carriage, and will secure perfect order. A store-room to follow the kitchen, and a smoking-room will also accompany the train.

Car-Starter.

WILLIAM M. STRATTON and William E. Stratton, of West-Troy, N. Y., have recently patented an improvement in apparatus for storing up, in a spring or springs, the power expended in arresting the motion of a car, to be used in setting it in motion again; and it consists in having the drum, which is employed to wind the tension-cord of the spring, made with such devices and arranged in such manner that it may be locked and held after being detached from the gearing connected with the axle to wind it up, so that the car may be allowed to run awhile before the power of the spring is applied; thus making the apparatus capable of retaining the power stored up in the spring while the car is going down a descending grade and using it on an ascending grade, the car running free between the grades. The invention also consists in certain novel devices for thus detaching, holding, and locking the winding-drum.

Patent Lubricators.

MESSRS. NATHAN & DREYFUS call attention to the following extract from the English *Mechanics' Magazine:* "But in lieu of a wire or needle being placed in the tube, which, by its continued friction, ultimately cuts a groove in the shafts on which it rubs," etc. In regard to this, Messrs. Nathan & Dreyfus say,

"The above statement is entirely contrary to the facts, as we now have been making and selling the wire or needle oil-cup for the past six years, and in no case has the wire ever worn the slightest groove in the shaft upon which the Dreyfus oil-cup has been applied. Thousands of our cups are in use upon the connecting-rods of locomotive engines in the United States and elsewhere, where the motion is much greater than on an ordinary revolving shaft; yet none have ever worn the slightest."

Facetiæ.

A DISCONSOLATE editor thus bemoans his departed better-half: "Thus my wife died. No more will those loving hands pull off my boots and part my back hair, as only a true wife can. Nor will ever those willing feet replenish the coal-hod or water-pail. No more will she arise amid the tempestuous storms of winter, and hie herself away to build the fire without disturbing the slumbers of the man who doted on her so artlessly. Her memory is embalmed in my heart of hearts. I wanted to embalm her body, but I found that I could embalm her memory cheaper. I procured of Eli Mudget, a neighbor of mine, a very pretty gravestone. His wife was consumptive, and he kept it on hand several years, in anticipation of her death; but she rallied last spring, and his hopes were blasted. Never shall I forget the poor man's grief when I asked him to part with it. 'Take it, Skinner; and may you never know what it is to have your soul racked with disappointment, as mine has been!' And he burst into a flood of tears. His spirit was, indeed, broken."

A CHICAGO advertisement reads as follows: "A very desirable back porch, elegantly furnished, suitable for lady and gentleman, or two single gents, for rent with board."

A BOY bawling in the street was asked the cause of his trouble, and replied, "I want my mammy: that's what's the matter. I told the darned old thing she'd lose me."

TRYING to do business without advertising is like winking at a pretty girl through a pair of green goggles. You may know what you are doing, but nobody else does.

A YOUNG married woman retires from society, buys lots of edgings, insertions, muslins, flannels, and so on, which she makes into the daintiest little garments, too large for a doll, and too small for herself.

"YOU want *nothing*, do you?" said Pat. "Bedad, an' if it's nothing you want, you'll find it in the jug where the whisky was."

A PRINTER'S devil, in an Omaha office, was bitten by a dog a few days since. The dog lingered several days, and then died in great agony.

SOME men are like cats. You may stroke the fur the right way for years, and hear nothing but purring; but accidentally tread on the tail, and all memory of former kindness is obliterated.

THERE are two reasons why some people never mind their own business. One is, that they haven't any business; and the second is, that they have no minds.

VANITY, long indulged, becomes so exacting at last, that it claims all you can do, and is never thankful for any service.

EVERY one looking downward becomes impressed with his own greatness, but looking upward, feels his own littleness.

SOME Western journal thus slanders a whole class of railroad men: "Twenty-five cent diamonds are becoming so plenty among railroad brakemen that they are compelled to wear a piece of carpet over their shirt-bosoms after dark to avoid giving lantern-signals when moving about at stopping-places."

A YOUNG man living in Lafayette, Ind., is humility personified. The other day he asked a young lady if he might be allowed the privilege of going home with her, and was indignantly refused; upon which, he inquired very humbly if he might sit on the fence and see her go by.

A PARTY of Fort Wayne young gentlemen dined sumptuously at a restaurant, and each one insisted on paying the bill. To decide the matter, it was proposed to blindfold the waiter, and the first one he caught should pay the bill. He hasn't caught any of them yet.

"WELL, Sambo, what's yer up to nowadays?" "Oh! I is carp'ner and jiner." "He, I guess yer is. What department do you perform?" "What department! Why, I does the circular work." "What's dat?" "Why, I turns de grindstone." "G'way."

A UTICA paper declares that the Clearfield fair consisted of a calf, a goose, and a pumpkin. It rained so hard the first night that the goose swam off, the calf broke loose and ate the pumpkin, and a thief, prowling around, stole the calf; and that ended the fair.

A NEGRO thus philosophizes: "All men are made of clay, and, like a meerschaum pipe, are more valuable when they are highly colored."

A MOTHER, in speaking of the smartness of her son, a lad of six years, said, "He can read fluently, repeat the whole catechism, and weed onions as well as his father." "Yes, mother," added the young hopeful, "and yesterday I licked Ned Rawson, throwed the cat in the well, and stole old Hickory's gimlet."

A SEXTON being very familiar with a physician, was asked whether he had entered into partnership with him. "Oh! yes," said he, "we've been together for some time; I always carry the doctor's work home when it is done."

A BASHFUL youth was lamenting to his paternal progenitor the ordeal of popping the question. "Pooh!" said the patriarch, "how do you suppose I managed?" "You'd better talk," responded the hopeful; "you married mother, and I've got to marry a strange gal!"

A MAN who assisted to empty several bottles of wine, afterward took a walk. The pavement was quite icy, and he exclaimed, "Very singular, wh-whenever water freezes, it always freezes with the (hic) slippery side up."

A NEW-ORLEANS editor said he counted 173 alligators in a sail of six miles along a bayou. That editor had probably taken too much Mississippi water, and sailed around the same alligator 173 times.

A PRINTER out West, whose office is half a mile from any other building, and who hangs his sign on the limb of a tree, advertises for an apprentice. He says, "A boy from the country preferred."

A STROKE of lightning accomplished the destruction of 1700 gallons of whisky in an Indiana town, a few days ago, but an eye-witness says it was a pretty even tussle between the two.

A GENTLEMAN, investigating the mysteries of a buzz-saw in a factory in Norwich, Ct., the other day, laid two fingers and a half upon it "to see if it was going." It was.

"WHAT has become of the old-fashioned doughnuts which our mothers used to keep in the old stone crock behind the pantry-door, and one of which went further in preserving quiet in the family than four barrels of soothing syrup will now?"

LAZY California bar-tenders place the ingredients of a cobbler in a tumbler, and then wait for an earthquake to mix them up.

A BROKEN-HEARTED widower in Indianapolis has erected a pine slab over his wife's grave, and presented a fine piano to the girl who was kind to him during his affliction.

"HUNTING the tiger, gentlemen," observed an English officer, relating his East-India experience to a friendly circle at a London club, "is capital sport—nothing better—except when the tiger takes it into his head to hunt you; then it is apt to become too exciting."

THE *News* says they "cleaned house" at the domicile of the editor of the Litchfield *Enquirer* last week. The editor was called home and intrusted with the artistic operation of painting the kitchen chairs. He finished one of them, and sat down on it to paint the others. They had to build a fire under the chair to thaw him off. It ruined the chair; but he has had a bay-window set in his pants, and they are now about as good as new.

THE railroad men down East are quizzing a new station agent, who made a requisition for "red oil" for signal-lamps.

IN crossing Rhode Island recently, a lumber wagon broke down, and obstructed the whole railroad travel of the State.

A CINCINNATI widow advertised for "every Christian in the city" to send her ten cents. She realized twenty cents, indicating an unexpectedly large number of Christians in that city.

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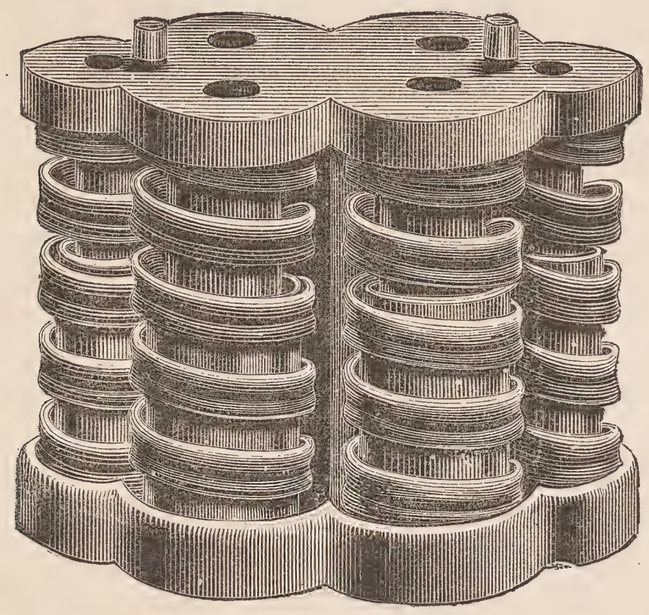

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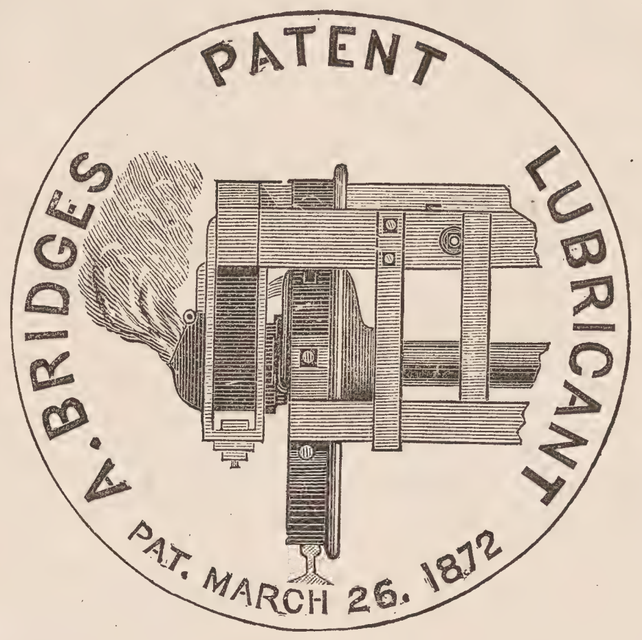

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In presenting this Lubricant to the notice of Railroad and Steamboat Managers and Operators in Machinery generally, I do so with a practical knowledge of its merits, and with confidence that it will be found to possess invaluable qualities as a

Lubricator and Counteractor of Friction.

It has been in use, during the past two years, on a number of Railroads and Steamers, and is highly approved of.

Parties wishing to make a practical test of the Lubricant will be furnished with sample on application.

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WM. R. BARR, President.

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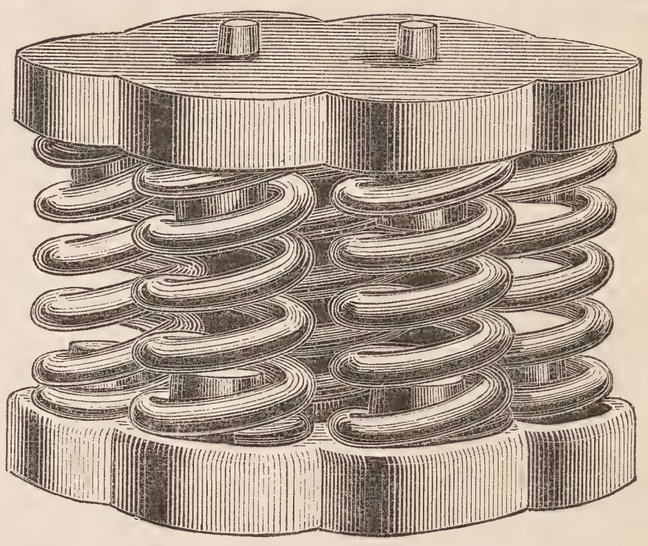

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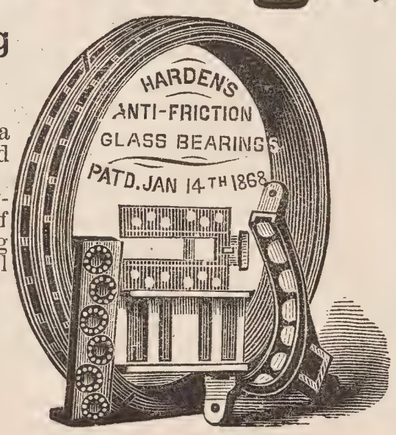

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M

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Maysville & Lexington			Maysville, Ky.
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Memphis & Little Rock	N. Greener	C. W. Wooldridge	Huntsville. Ark.
Memphis & Charleston	Michael Burk	A W. Drew	Memphis, Tenn.
Memphis & Charleston	L. M. Sellars.	Fabien Varin	Huntsville, Ala.
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J'kson, Lans'g & Saginaw Div.	Andrew Wilson	Andrew Wilson	Jackson Mich.
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Montgomery & Eufaula	James McCann	I. E. Holmes	Montgomery, Ala.
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Mobile & Girard	William Eyles	A J Nix	Girard, Ala.
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N

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Nashville & Decatur	C. B. Knowles	C. B. Knowles	Nashville. Tenn.
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West Division	H. Elliott		East St. Louis, Ill.

P

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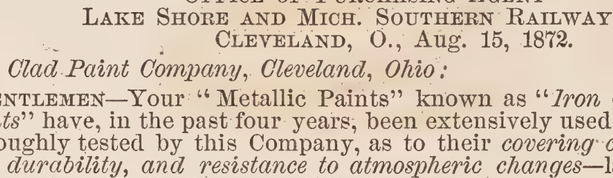

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Etc., etc.

OFFICE OF PURCHASING AGENT
LAKE SHORE AND MICH. SOUTHERN RAILWAY,
CLEVELAND, O., Aug. 15, 1872.

Iron Clad Paint Company, Cleveland, Ohio:

GENTLEMEN—Your "Metallic Paints" known as "*Iron Clad Paints*" have, in the past four years, been extensively used and thoroughly tested by this Company, as to their *covering capacity, durability, and resistance to atmospheric changes*—latter "paint destroyer"—the most difficult to overcome in outside paints. We can emphatically accord them the highest position over any paint heretofore produced, for Cars, Roofs, Stations, Bridges, etc. Very respectfully yours,

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Purchasing Agent L. S. & M. S. R. R.

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The Cleveland Bridge and Car Works,

[Established in 1851.]

THE McNAIRY & CLAFLEN MANUFACTURING COMPANY, Proprietors,

BUILDERS OF

RAILROAD AND HIGHWAY BRIDGES,

EITHER OF IRON OR WOOD.

Pneumatic and Screw-pile Sub-structures, Railroad Passenger and Freight Cars, Street Railroad Cars.

☞ Post's Patent Iron and Combination Bridges; Howe Truss Bridges, with Patent Iron Clamps; Street Railroad Cars, with Higley's Patent Running Gear and Brake.

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OFFICES—Waring Block, cor. Bank and St. Clair Streets.
WORKS—On Watson, Hamilton, and Lake Streets.

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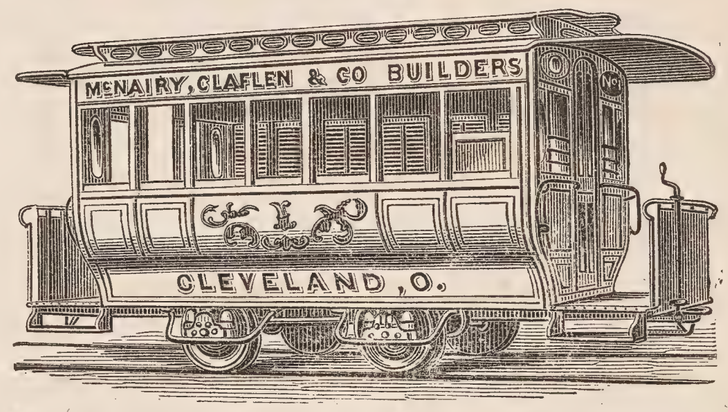
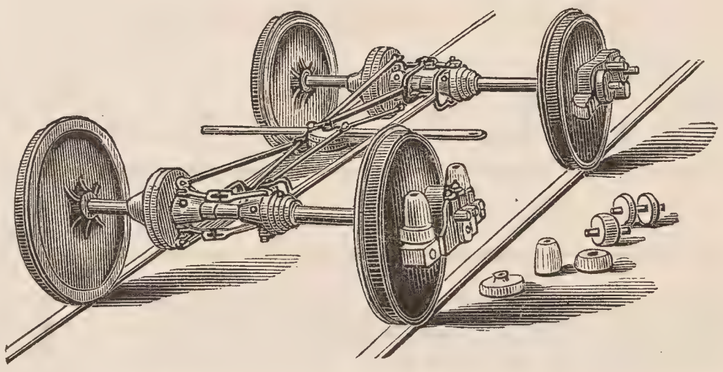


The Lightest Running, Easiest Riding, Most Durable, and Most Economical Street Car in Use.



Higley's Patent Street Car Running-Gear and Brake.

Made and Sold by THE MCNAIRY & CLAFLEN MANUFACTURING COMPANY, **Cleveland, Ohio.**

VOSE, DINSMORE & CO.,

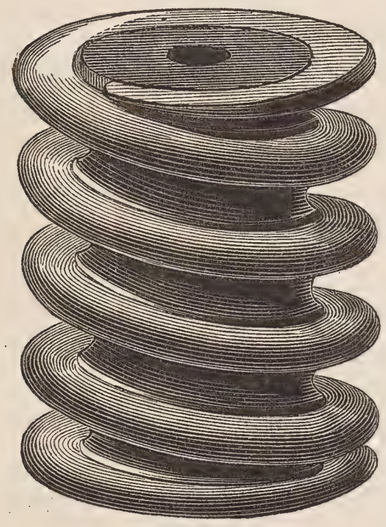
MANUFACTURERS OF

Railway Car Springs.

1 Barclay Street, New-York.
238 Michigan Avenue, Chicago.
713 North Second Street, St. Louis.

RUBBER CENTRE SPIRAL SPRING.

PATENTED 1865.



This Spring is very superior for freight. It is made of a Stee Spiral Coil, with India-Rubber Filling, and has *more motion* than any other Steel Coiled Spring in use.

Size, 4½ × 6 inches, to be used eight or ten to a car, without castings.

ADVERTISE

IN THE

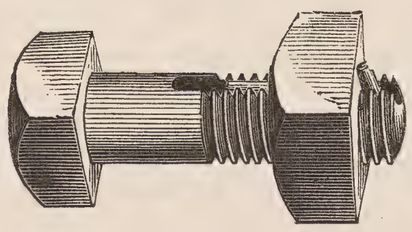
CAR-BUILDER.

WM. COURTENAY, President. CHAS. F. COBB, Secretary.

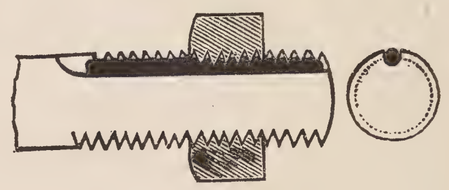
The Lock-Nut and Bolt Co., of New-York,

Office No. 61 BROADWAY, New-York.

Manufacturers of all kinds of BOLTS, for FISH-PLATES, CARS, BRIDGES, MACHINERY, CARRIAGES, &c., with the



"CUMMING NUT-LOCK,"
Patented
June 16, 1868,
August 23, 1870.



SECTIONS.

Unequaled for CHEAPNESS, SIMPLICITY & EFFECTIVENESS.

This simple device, as will be seen by the engravings, consists of a groove being cut in the threaded part of a screw bolt into which is placed a key of copper wire, or other soft metal; when the nut is screwed on, it cuts a thread on the key, thereby making it impossible for the key to get out until the nut is taken off. When the nut is screwed up to its place, that part of the key over which the nut has passed is riveted up against the nut with a small punch, destroying the thread on the key. The nut, therefore, can not move backward until force is used, as with a wrench.

The groove can be rapidly cut with a simple machine designed for the purpose.

Experience has proved this device absolutely reliable, and it is the cheapest of all known devices for the purpose. By its use, old bolts on which the nuts have become too slack for use can be made as good as new, making it a great saving to railroad companies and others in that item alone. It is cheaper than a check-nut.

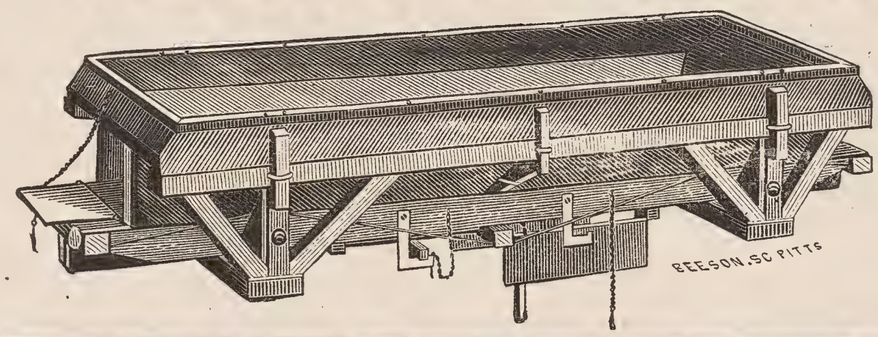
If the bolt should become slack from shrinking of timber or other causes, *the nut will always remain firmly attached to the bolt*, and, with the wrench, can be screwed up *any distance*, and the wire riveted up any number of times, or can be taken off without injury to the nut or bolt.

This is the only method in use that locks the nut firmly to the bolt without regard to place or surroundings, all others require some attachment that holds the bolt in its position, and a washer or other attachment to keep the nut from turning.

DIRECTIONS FOR USE.—Place the copper key in the slot, pointed end out, and beveled side up, in such a position that when the nut is screwed to its place about three-eighths of an inch of the key will project beyond its outer face. Then screw the nut to its place *over the key*, allowing it to cut its own thread in the copper. Then take a narrow flat set punch, and rivet the projecting part of the key *solidly* against the outer face of the nut. To tighten the nut: screw it up, and rivet the key tighter. To remove the nut: simply apply the wrench and unscrew the nut. It will cut its own way out through the copper. The same key can be used several times, by moving it outward a few threads in the slot.

IMPROVED FREIGHT AND COAL CAR.

CHEAP, LIGHT, AND STRONG.



Weighs a ton less than the ordinary eight-wheeled coal car, is equally convenient for dumping or shoveling, and does not require to be scraped out, the contents falling between the rails. It is adapted to the carrying of lumber or other long freight, as well as coal, ore, etc. It has doors in the bottom between the trucks for dumping, and also end doors for convenience of loading and unloading. Apply to patentee,

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Number One Black Varnish,

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A SPECIALTY.

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Crown Coach Japan,

(*For Hardening Paints.*)

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(*A Two-Day Rubbing.*)

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Hard-drying Body Varnish,

(*A Four-Day Rubbing.*)

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Permanent Wood Filling, Light,

(*For Priming Light-Colored Work.*)

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It is the most Complete, Elaborate, and Comprehensive Guide Book ever Published in this or any other Country.

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VOL. IV. 1872.

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"It is to the traveler on the Pacific Road what the compass is to the mariner at sea."—*Odd Fellows' Excursion Party.*

ENLARGED, REVISED, RE-WRITTEN.

☞ If the volume for 1871 merited the following notice from the officials of the Union Pacific Railroad, what encomiums should the greatly improved book for 1872 elicit?

UNION PACIFIC RAILROAD,
General Passenger Department,
Omaha, Nebraska, Aug. 9, 1871.

GEO. A. CROFUTT, Esq.,
New-York.

Dear Sir:

You want our opinion of the new "CROFUTT'S TRANS-CONTINENTAL TOURISTS' GUIDE." We think you had a pretty substantial indorsement of its merits when the Union and Central Pacific Companies ordered thousands of copies for circulation in Great Britain and on the Continent, as an advertisement of our line. I have no hesitation in saying we give our unqualified approval of your book, as the first, most complete, and reliable work ever published to illustrate and describe the wonderful scenery, agricultural and grazing districts, mining resources, etc., of the vast country traversed by this route between the Missouri River and the Pacific coast. Its condensed form, numerous engravings, and correct maps, make it indispensable to the tourist, while its moderate price will put it within the reach of the general traveling public.

Yours truly,
THOS. L. KIMBALL,
General Passenger Agent.

I concur fully in the foregoing.
T. E. SICKELS, Superintendent.

New-York, Nov. 17, 1871.

From the "Father of the Electric Telegraph."

Dear Sir: I thank you for the copy you have sent me of CROFUTT'S TRANS-CONTINENTAL TOURISTS' GUIDE. From a cursory glance at its contents, I found it deeply interesting, and it can not fail to be indispensable to tourists who wish to explore the magnificent scenery, springs, mineral wonders, and other productions of the Great West.

Truly yours,
SAMUEL F. B. MORSE.

GEO. A. CROFUTT, Esq., New-York.

One-half the people can not take *Castor Oil* from its terribly nauseating taste, and recoil in the throat. The Castoria prepared by D. Pitcher is purely vegetable, perfectly harmless, pleasant to take, and more effective than Castor Oil. It does not purge or gripe, but regulates the system, and operates when all other remedies have failed. It acts like magic for Stomach-ache, Constipation, Flatulency, Croup and Worms. It contains neither Minerals, Morphine, nor Alcohol. Its soothing, quieting effect produces natural sleep, and particularly adapts it to crying and teething children. No article has ever met such unqualified indorsement by the Physicians. Take no more Bitter Pills, Narcotic Syrups, Griping Purgatives, or Sickening Oils. The Castoria costs but 35 cents, and when once tried you will never be without it.

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Denison's Patent Cooling and Lubricating Compound,

FOR COOLING HOT JOURNALS.

It will immediately cool a *hot journal* while the cars are in motion, and no journal will heat where the box is packed with it.

And Dealers in Machinists' and Railroad Supplies.

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W. B. POST. C. W. KALKMAN.

Brilliant Railroad Car Lamp, WITHOUT KEROSENE.

New Law of Massachusetts

ABOUT LIGHTING PASSENGER CARS.

A Law has passed the Massachusetts Legislature (May 29, 1872) prohibiting the use of oil below 300° fire test, instead of 110° as heretofore. The

Mineral Sperm Oil

meets the requirements of this law. It is now used by **all the Roads leading from Boston,** and by many other Roads, and by a large number of **Pullman's Palace Cars,** in the place of kerosene or candles.

THE LIGHT IS EQUAL TO KEROSENE

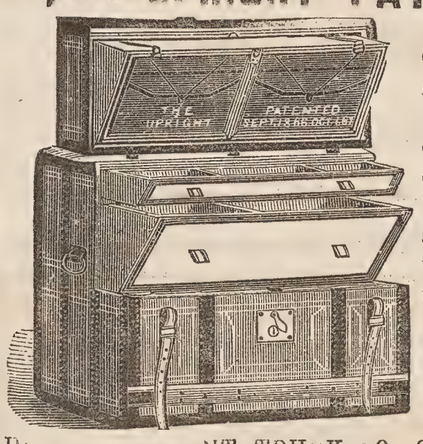
and the expense not half that of candles.

To use this oil in our common car lamps, now in use in all parts of the country, it is only necessary to **Change the Burner,** (costing about 50 cents per lamp.) For new lamps, in place of candles, send for lithograph and price-list. This oil is 55 cents per gallon in Boston, New-York, Pennsylvania, etc.

WILLIAMS, PAGE & CO., Boston, Mass.,

Manufacturers of Car Lamps and Car Candle-Lamps, and dealers in Mineral Sperm-Oil and Car Candles.

THE UPRIGHT PATENT TRUNK



Opens without removing from the wall.

Instead of trays to lift out, it is arranged with drawers.

It is STRONGER, as only a small portion opens, whereas in the old style the whole top comes off.

Same room in bottom of the trunk for dresses as in the old style.

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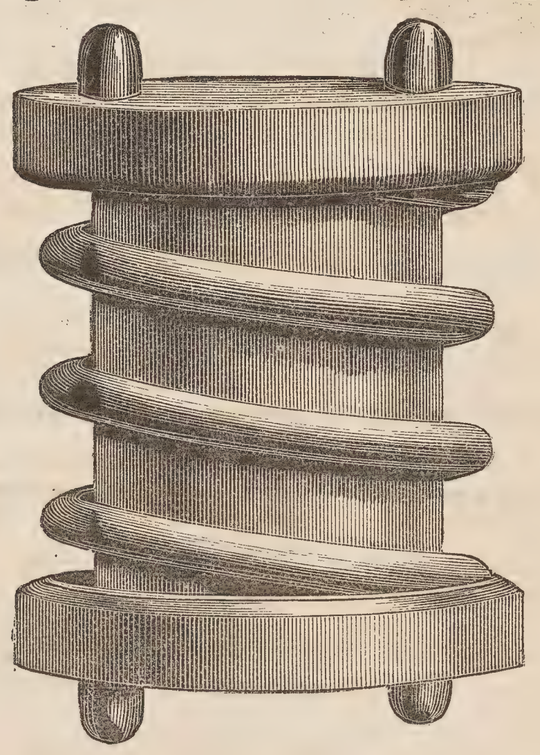
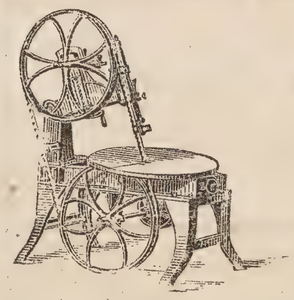


This Spring is used for bearing purposes in passenger or freight-car trucks, and can be adjusted to equalizing-bar or bolster. It consists of a large central column of rubber, surrounded by a powerful spiral coil of round steel, both kept in place by seat castings, and combining in its action all the strength and elasticity of the two materials.



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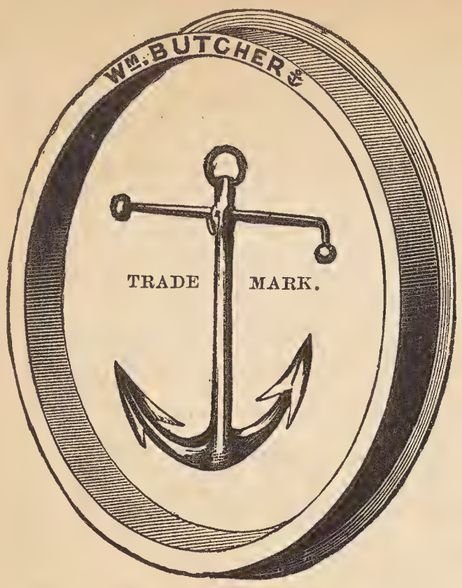

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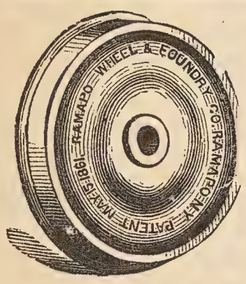

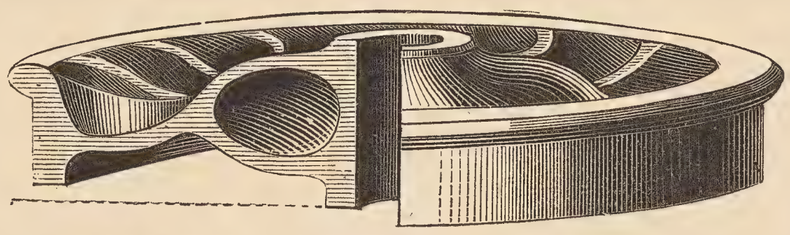

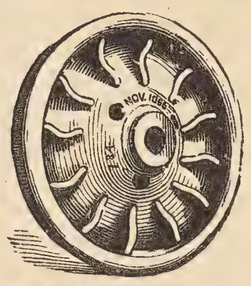

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Mahogany and Walnut Planks and Boards, of Standard Thicknesses.

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Downer's Cleaning and Polishing Oil,

For Bright Metals of all kinds.

Is an article of real merit, and as such it is offered to the public.

Engineers and Firemen pronounce it superior to any other article which has heretofore been used, in the ease of cleaning, in the rich lustre produced, and the length of time it retains its polish.

Railroad Companies will find it well adapted to their wants.

Guaranteed to give satisfaction.

Downer's Vegetable Steam Boiler Anti-Incrustation Liquid,

For the prevention and removal of Scale, is likewise offered upon its own merits. For locomotive purposes it is of great value. Always guaranteed.

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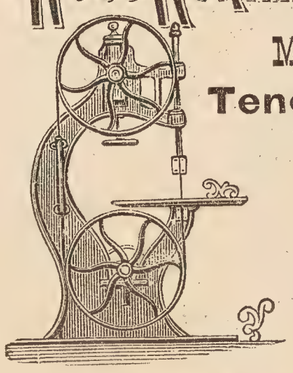

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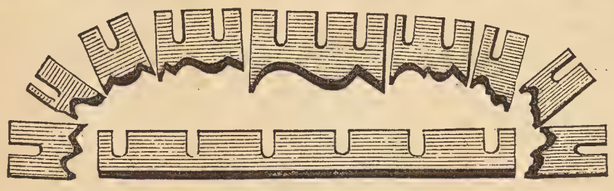

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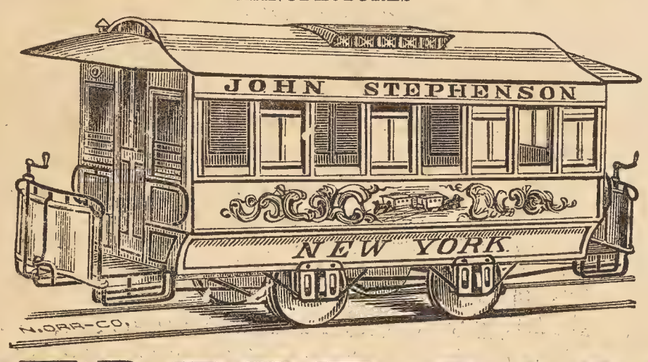

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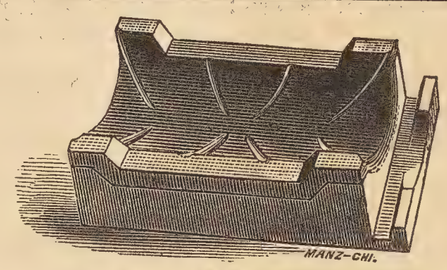

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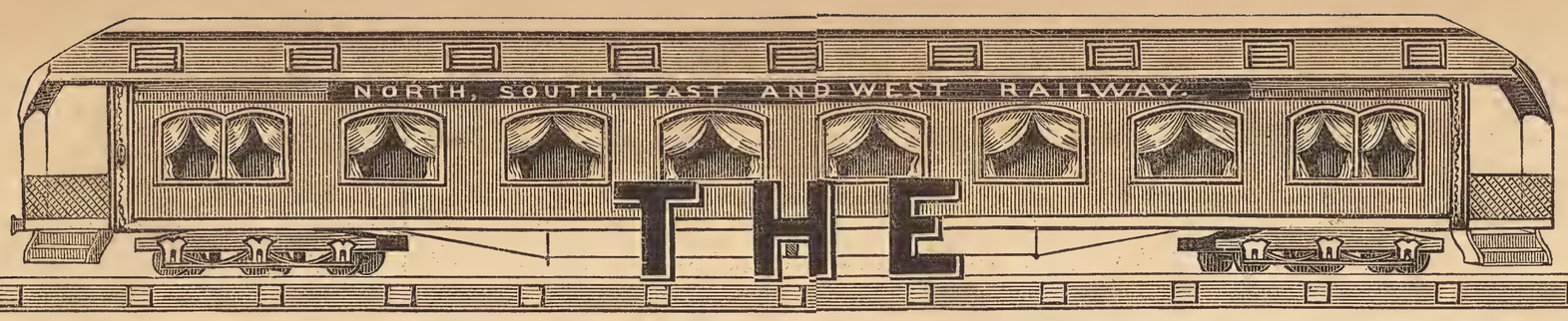

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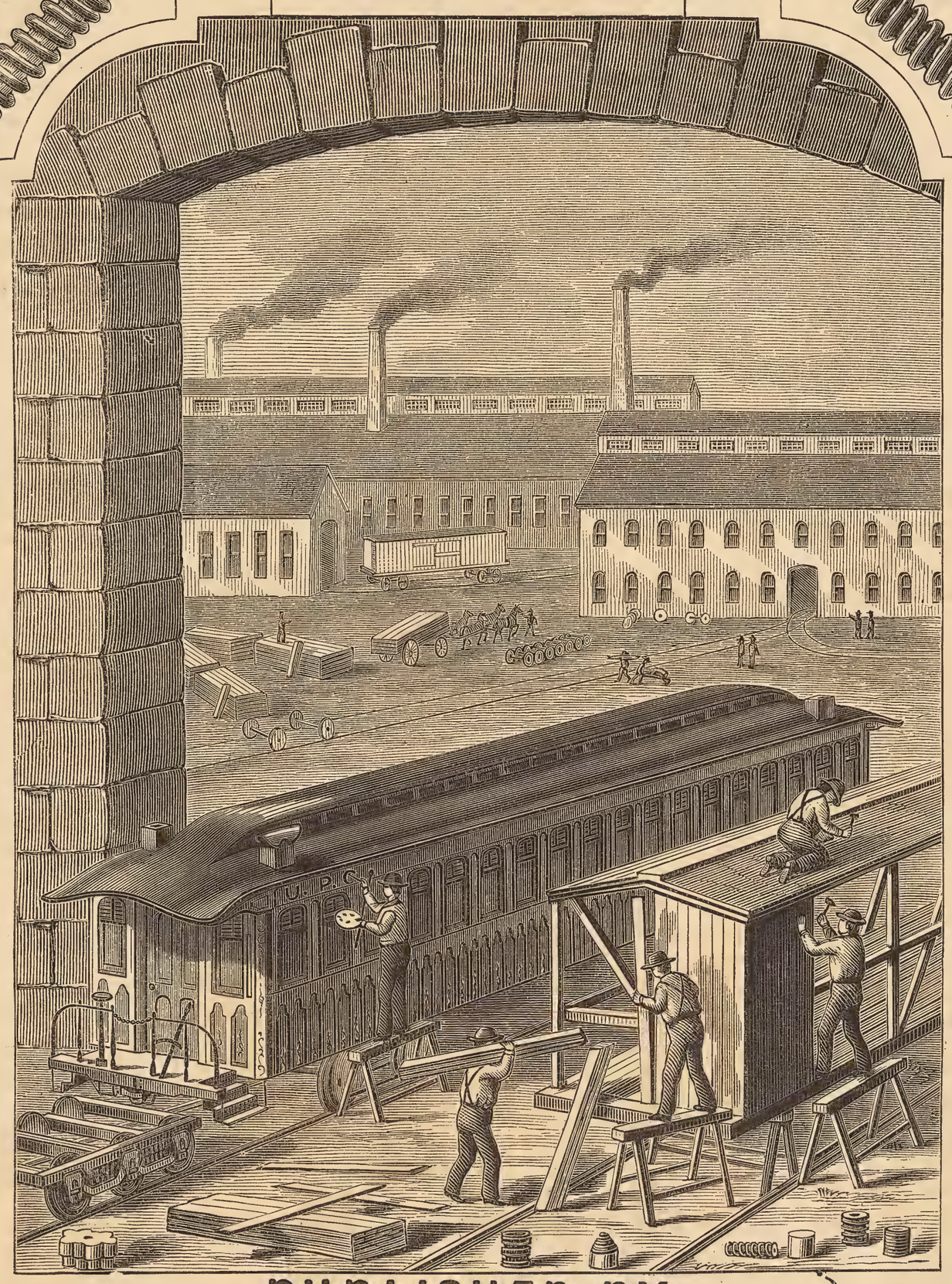

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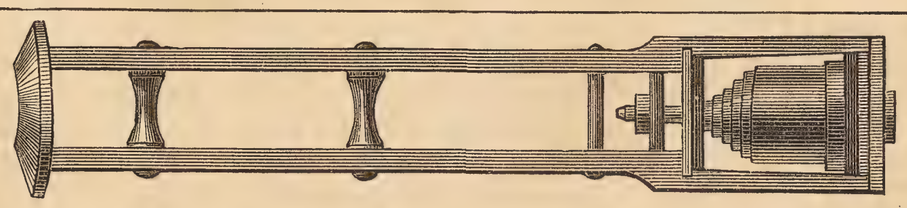

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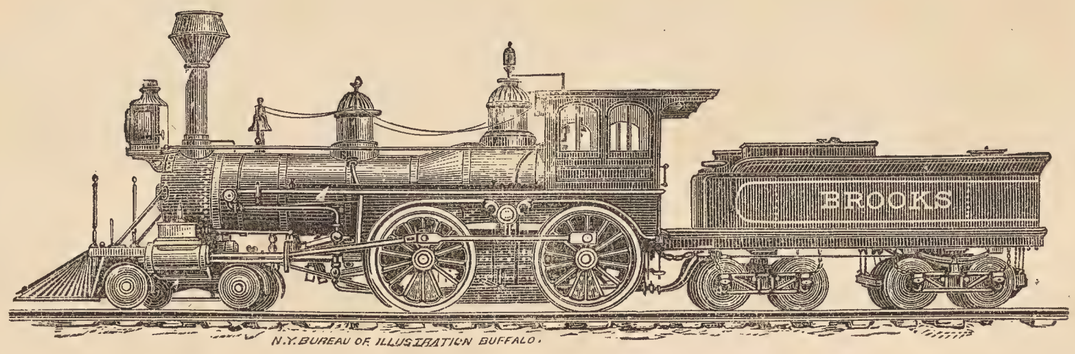

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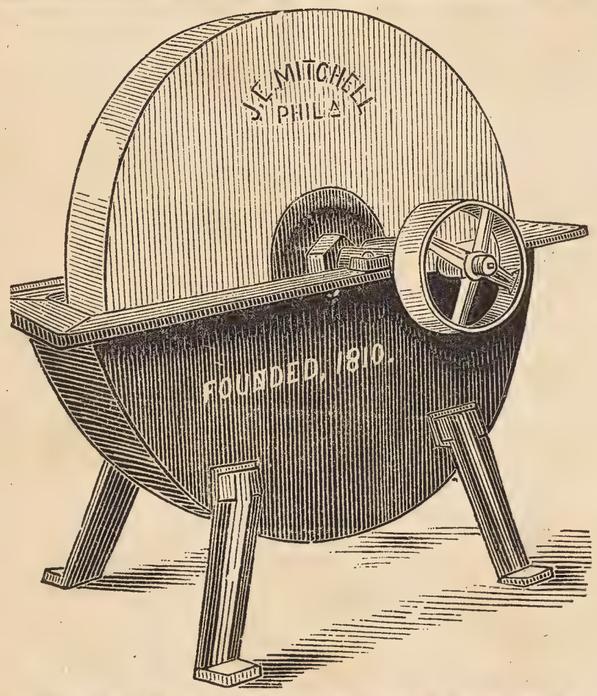

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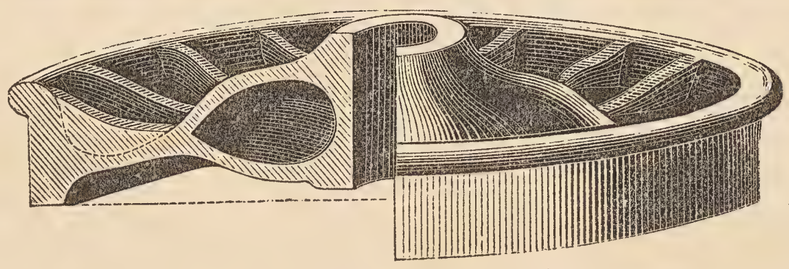

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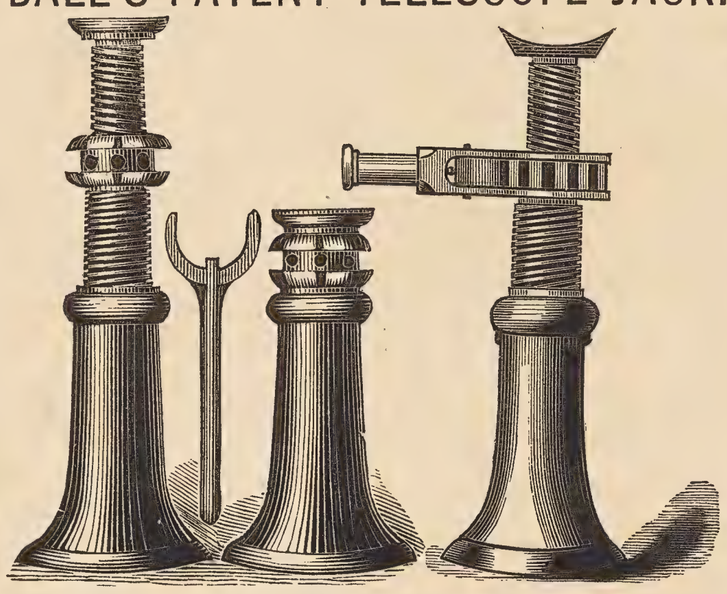

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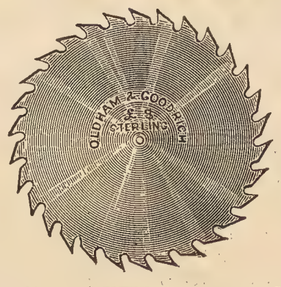

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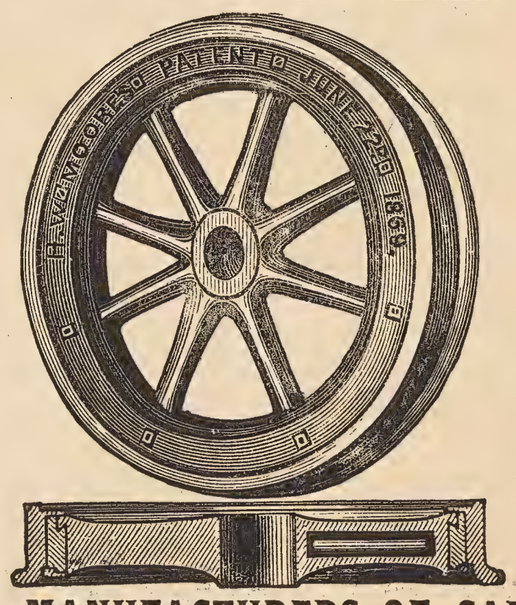

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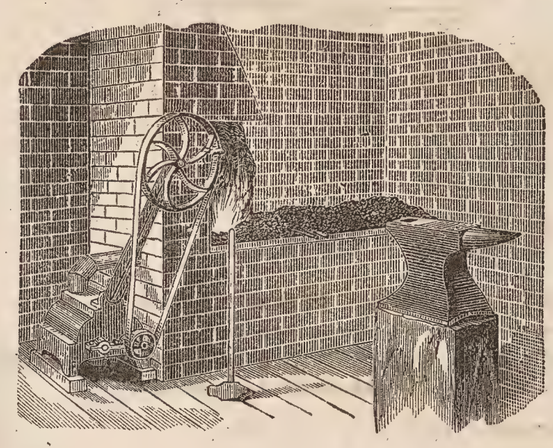

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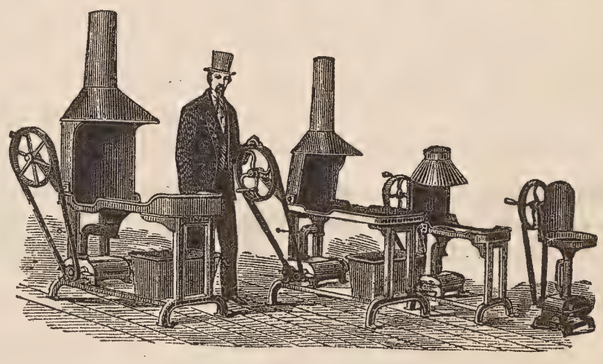

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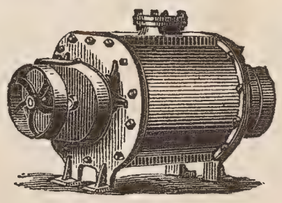
OF ALL  SIZES,

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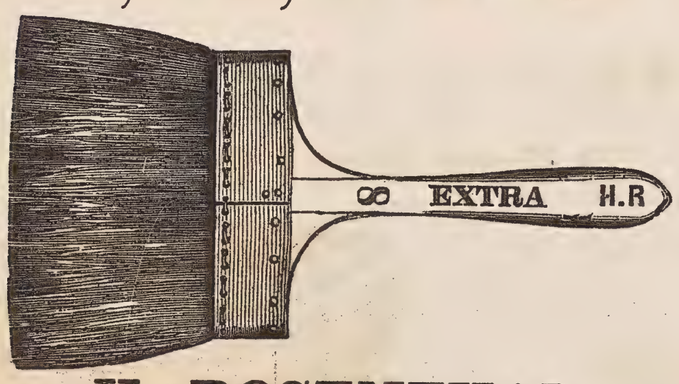

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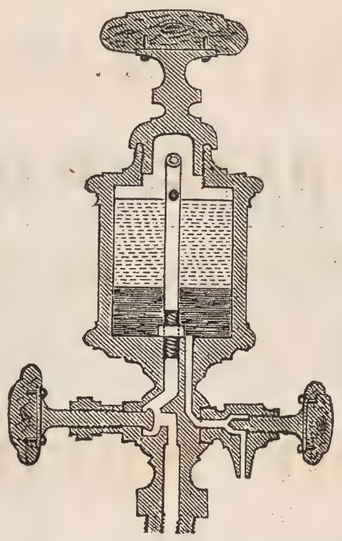

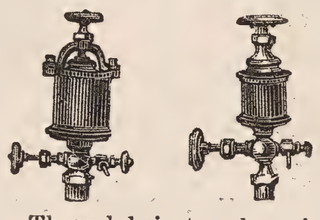

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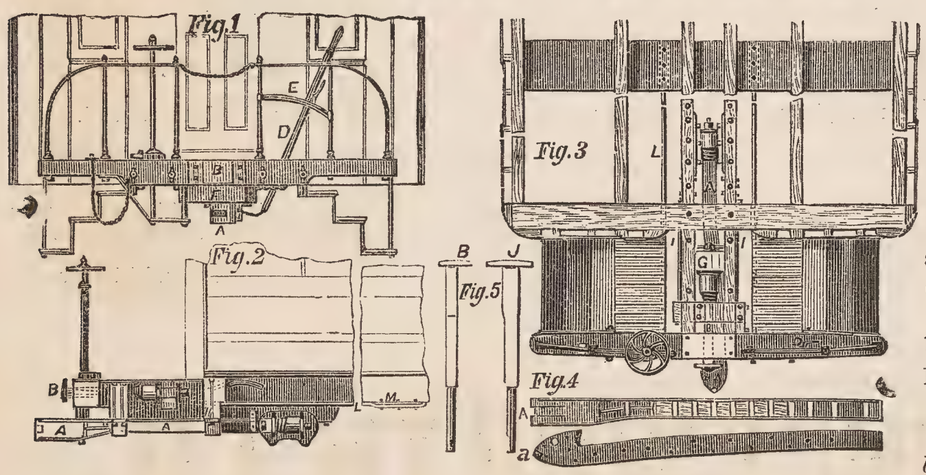

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DESCRIPTION.

Figure 1 is an elevation; Figure 2, a longitudinal section; Figure 3, a plan of an end of a car to which the arrangement has been applied; and Figures 4 and 5 show top and side views of the "Hook" and "Buffer," drawn on a larger scale than that of Figures 1, 2, and 3.

The letters refer to the same parts in all the figures. A is the coupling "Hook," B the "Buffer," C the "Stop," D the "Lever," E the "Quadrant Ratchet," F the "Truss Beam," G the "Spring Beam," H the "Suspender Beam," I the "Upward Trusses," K the "Main Spring," L the "Downward Trusses," and M the "Bolster."

The Platforms, instead of being located below the centre line of the main sills of the cars, are placed *in* that ine, and held there by the Trusses I and L, so that the point of contact (in Buffers B) is *in* the said centre line and *not below* it.

The coupling "Hook" A is attached to the draw spring the same as the ordinary draw head, and at the same height above the track, but in such a manner that the outer end is free to move laterally for a short distance. The Coupling Hook projects beyond the platform. The Stop C is placed under the Buffer Beam to prevent accidental uncoupling. When two cars are brought together, the Coupling Hooks, from *their shape*, push each other aside, until the Buffers B are compressed hard on the Buffer Springs, then—*the points of the hooks having passed each other sufficiently far*—the Hooks are carried forward by their main-springs, and thus the "*Coupling*" and "*Compression*" are both effected automatically *and at the same time*, and without the use of links and pins. When two cars are thus coupled together, the *head* of the *Hook* of each car is under the Buffer Beam of its opposite car, and the platforms are close together, (about 4 inches apart.) The effect of this is, *one platform can not be forced over the other*, nor can a *child* fall between the platforms; the dust and rain are nearly all shut out; the "Compression" makes the train run steadily, and prevents all jerking at starting and stopping.

DELAWARE CAR WORKS,

Manufacturers of Sleeping, Saloon, Drawing-Room, and Passenger Cars. Employs 760 Hands.

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NATIONAL SPRING WORKS,

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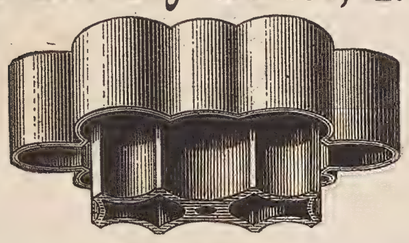
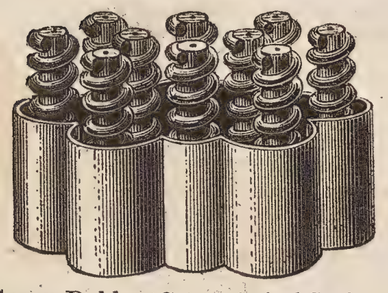
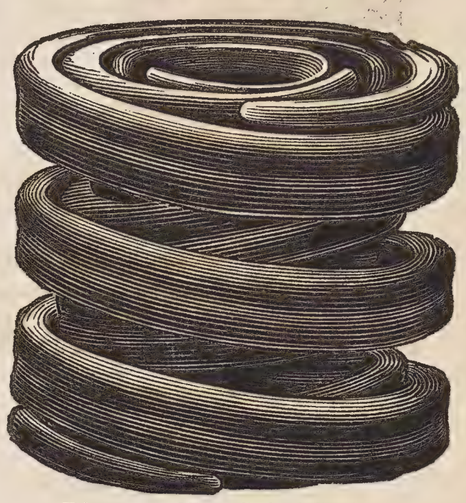




Group Rubber Centre Spiral Spring, (open.)

MANUFACTURERS OF

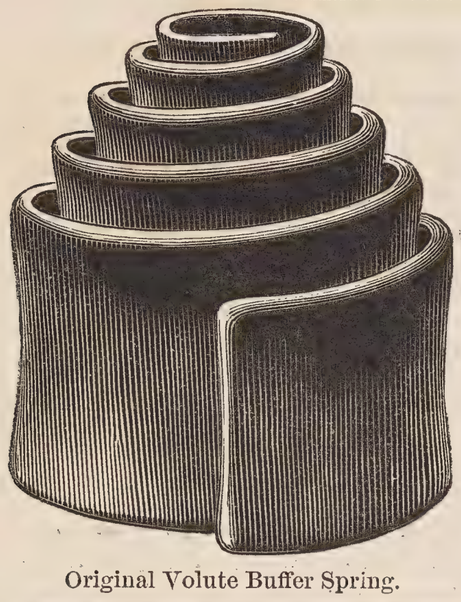
Railway Car Springs.



Dinsmore Nest Spiral Spring.

Our *Rubber Centre Spiral Group Spring* is pronounced the best freight spring in use. Any number of spirals can be grouped. Spirals furnished with or without cases.

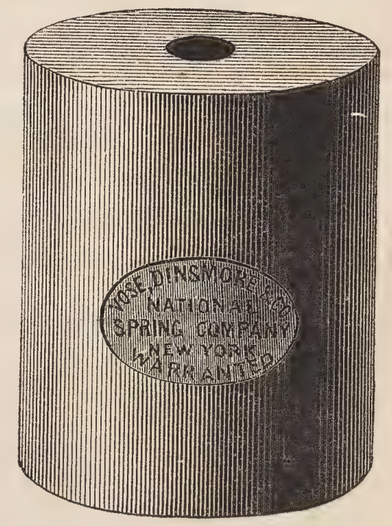
For bearing purposes on the equalizing bar, or for freight cars, our *Dinsmore Spring* is unsurpassed; it is also extensively used as a buffer. Being made of fluted bars of steel, with round edges, and with free spaces between the several coils, all friction from contact is absolutely avoided.



Original Volute Buffer Spring.

Our *Volute Spring* is too well-known as a buffer to require comment. They are made either plain, concave, or corrugated, have a perfect temper, and are without friction.

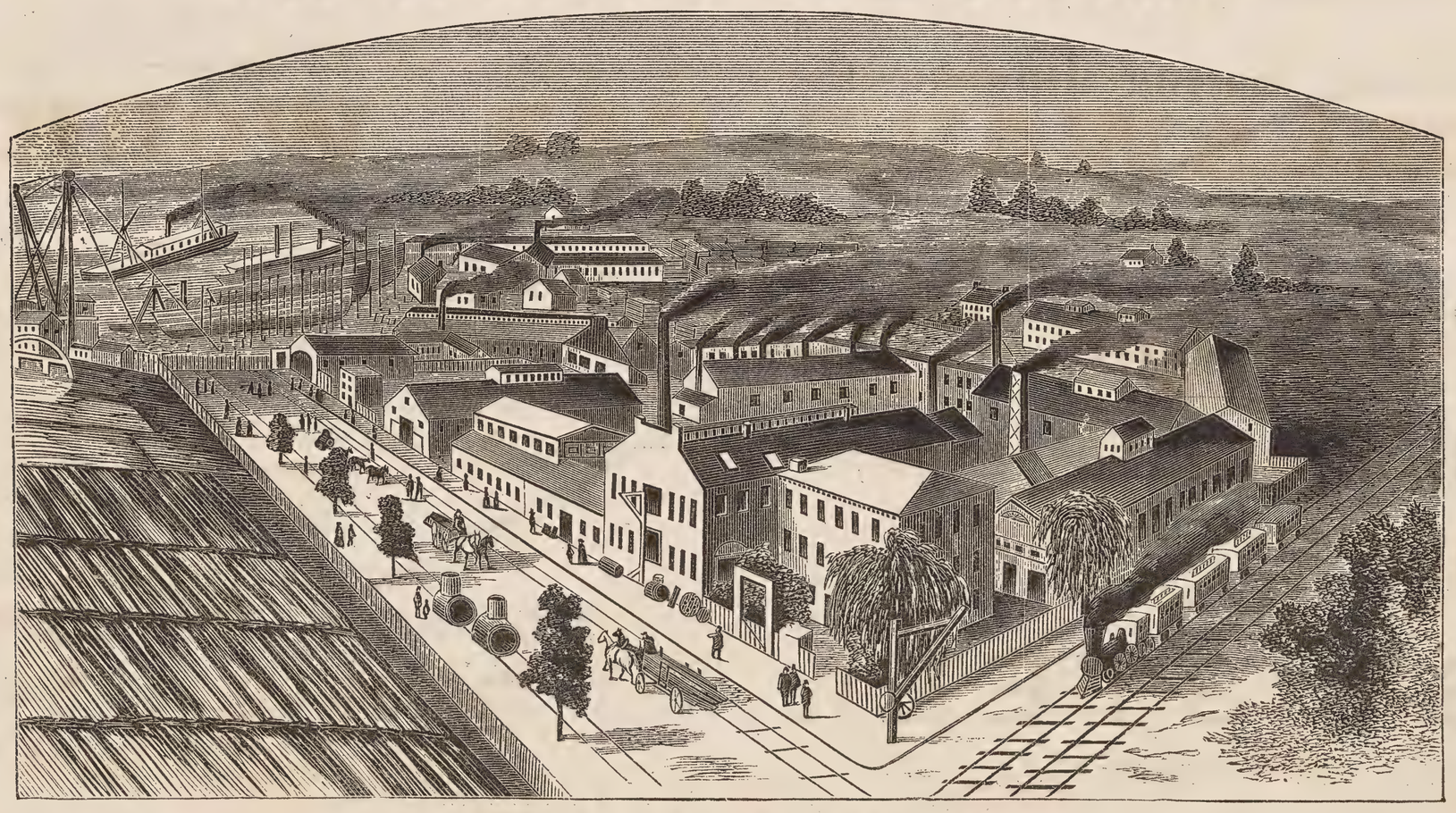
We manufacture solid *Rubber Springs* of as fine a quality as any in the market, and combining every requisite of power, elasticity and durability.



Rubber Spring.

THE HARLAN & HOLLINGSWORTH CO.,

WILMINGTON, DELAWARE,



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RAILROAD CARS:

FIRST and SECOND-CLASS DRAWING-ROOM, SLEEPING, BAGGAGE, MAIL, and EXPRESS, BOX, and FLAT.

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ABSOLUTE COOKING.

PERFECT ECONOMY.

The meat is cooked without the access of air, water, OR STEAM. The juices and flavor are all preserved.

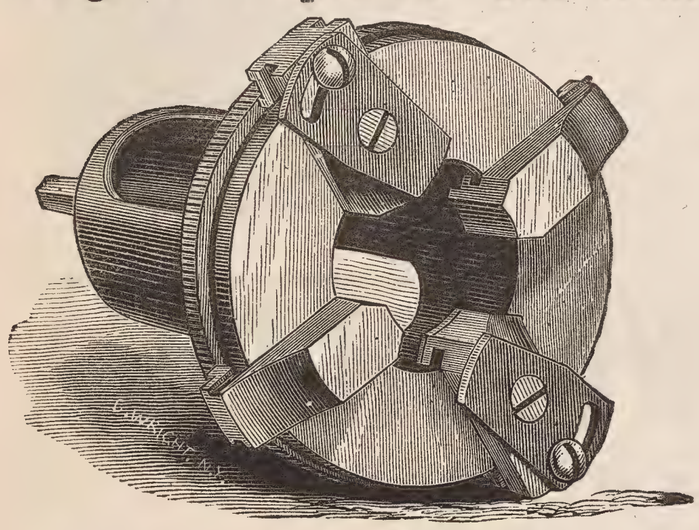
RICH MAN'S LUXURY,

POOR MAN'S FRIEND.

This wonderful system of cooking is patented by Captain Frederick P. Warren, of the Royal Navy, where it has been adopted by order, and also in the English Army, and is in universal use in families throughout Europe. In the few months since it has been patented in this country it is creating the greatest interest. A large number are already in use, and afford perfect satisfaction in every instance. Mrs. Henry Ward Beecher, in the *Christian Union*, gives it most favorable notice, and is now using one of the utensils. Send for descriptive pamphlet, embracing testimonials and prices to

322 Broadway, P. O. Box 3051, New-York.

Douglass' Improved Universal Hollow Auger.



It will cut from ⅜ to 1½ inch. It is warranted to give satisfaction; is very light, and with proper usage will last a life time. Any part can be replaced, if broken, as it is all made to a guage. Cutters can be sent by mail.

Cutters, 30 cents per pair.

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Douglass Manufacturing Company,

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Cook's Patent Boring Implements,

AND A LARGE VARIETY OF MECHANICS' TOOLS,

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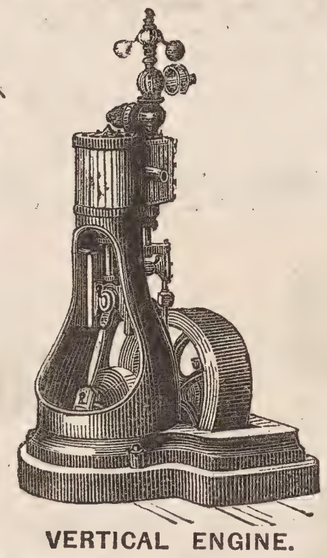
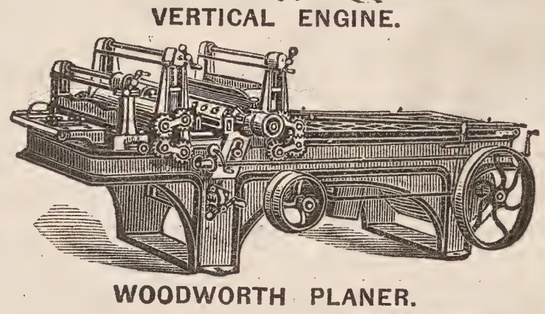
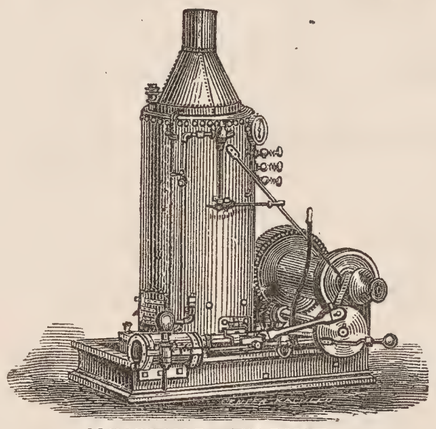


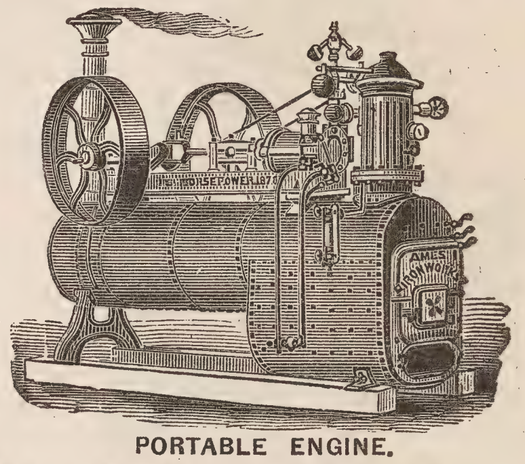
VERTICAL ENGINE.



WOODWORTH PLANER.



HOISTING ENGINE.



PORTABLE ENGINE.

HORIZONTAL ENGINES, BOILERS, SAW MILLS, ETC., ETC.

The above are First-class in Style and Workmanship, and are used by some of the best Roads and Contractors in the country. Send for Prices, etc., to

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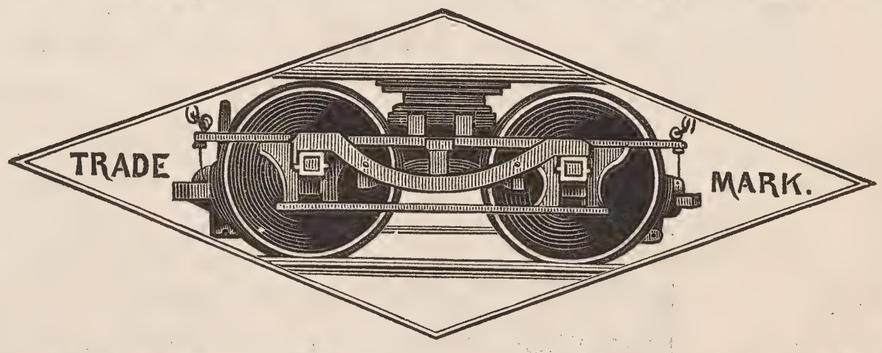

Machinery Oil.

TALLOW PACKING FOR CAR JOURNALS.

We can furnish the best evidence of the success of this Packing.

The Packing dispenses with the use of Oil and Waste, and prevents all heating of journals, requires less time and attention than any other now manufactured, and causes a saving of at least twenty-five per cent.

The Tallow Lubricator can be used on machinery wherever Tallow is used. One pound of the Lubricator will do the work of at least four pounds of plain Tallow.

The Oil will give complete satisfaction both on the lightest as well as on the heaviest machinery.

AS SPINDLE OIL

it is unequaled. IT WILL NOT GUM, and is the most economical in use.

It will surely prevent a Hot Journal.

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Oct. 1872

DEVOTED TO THE INTERESTS OF RAILWAY ROLLING STOCK.

Vol. III. No. 4. | OCTOBER, 1872. | 50 Cents per Annum. Single Copies, 10 Cents.

A New Steam Street-Car.

THE Utica *Herald* gives the following account of a recent trial of a new steam street-car at Ilion, N. Y.:

This car appeared at the first glance to differ not at all from the ordinary street-car. Closer inspection revealed the fact that one platform was a trifle longer than the other, and could not be gained from the inside of the car. In the space ordinarily used as a doorway, stood a compact boiler and engine. All the machinery does not occupy more space than an ordinary, modern base-burning parlor stove of the larger size, and does not use one foot of passenger-room. The engineer stands upon the platform, occupying the place of the driver.

The engine, perfected by William Baxter and now in use at Ilion, is made on the principle of the English compound engine, in use on ocean steamers. It has two cylinders, and drives the car by direct crank connection without any intermediate mechanism. The steam is admitted from the boiler to the first cylinder, which is smaller than the other, and which is, in fact, a "high-pressure" cylinder. It escapes from this to a chamber formed by a jacket around the boiler, where it is superheated, and then it is used in the larger cylinder. As it finally escapes, it is reduced to about atmospheric pressure. By this means the entire force of the heat is used, and economy of fuel as well as of space of the boiler is obtained. The engine is arranged to consume its smoke, and with the low pressure of the exhaust both soot and noise are avoided. The engine, as ordinarily run, is a five horse-power engine, and will take a load of thirty or more passengers over a reasonably level track at the rate of fifteen miles an hour, at least. The engineer can instantly and at pleasure throw the steam from the boiler directly into both cylinders, and give his engine, for the time, twenty-five horse-power. It thus takes its load easily, and without retarding its speed, up grades of four hundred feet to the mile. It is, in fact, a five horse-power engine, with power to increase its power five times, without stop and without loss of speed. Having no gearing, cogs, or intermediate mechanism between the engine and the crank of the drive-wheel, there is comparatively no danger from disarrangement in that quarter. The outer jacket of the boiler is shut in from the body of the car by a wooden screen, through which no heat passes at any time. The exhaust in the summer goes under the car. In the winter, it is taken through the car by pipes which give moderate but equal temperature to the atmosphere. Mr. Baxter has embodied in this engine another feature, by which the objections to reversing the engine are entirely done away. Running at the rate of six miles an hour, he stops the loaded car in eight feet. Going at the rate of twelve miles an hour, he stops in thirty-two feet. The great economy in steam gives equal economy in fuel, so that coal is consumed at the low rate of one ton to the thousand miles. As nothing precedes the car, all the windows can be opened without trouble from dust. Smoke, there is none; there is nothing to raise dust except the car itself, and what dust it raises is under the car and left behind. When the car is in motion, the front windows can be opened, and a refreshing breeze is felt, with none of the ordinary discomforts.

About twenty persons started from Ilion on Saturday; but before the ride was over, the number was more than doubled. The party rode first to Frankfort, dashing out of Ilion at a lively rate; but slowing just as the car seemed in imminent danger of running into a horse-car which it overtook. The engineer seemed to have perfect control of the car, and handled it by steam far more easily than it could have been done by horse-flesh. The road from Frankfort to Ilion needs some leveling, and the curves especially need attention, the outer and inner rails being often on a level; in some few places the inner rail was apparently the lowest. The real test came in going over the canal bridge between the villages. The bridge is reached on either side by a grade of about eight feet in one hundred, and the immediate approach to the bridge, each side, is by a very sharp, bad curve. It will be seen that the combined curve and grade made this a bad place; but we rode safely up the grade, around the curves, and down again, and gayly away to Frankfort. The return from Frankfort to Ilion was made at the rate of fifteen miles an hour, in spite of rough roads, curves, and grades.

After reaching Ilion, the car was run over a track still rougher than the first, but without grades, to Mohawk and return. During the afternoon, the car met or overtook in the road, at no place very wide, from fifty to one hundred horses, without an accident, so far as we learn.

Electric Railroad-Car.

THE following is an extract from the report of a committee appointed by the managers of the Nashville Industrial Exposition to examine the Gentry electric car:

The engine is composed of a number of magnets, so as to obtain a motive-power of 850 pounds, or a one horse-power. The armature is made to work similarly to the pitman of a sewing-machine, and takes the place of the piston of a steam-engine. This works by breaking and closing the circuit by means of a short lever, worked easily by the hand, and so fast that the movement at either extremity is imperceptible, making it appear as a solid piece, just as a red-hot rod or burning stick appears if moved rapidly by the hand. This armature rapidly turns a driving-wheel, (by which additional power is obtained,) and this works the wheels under the car, propelling it at a very rapid rate. The road, being elevated upon a single row of poles, is level, and the cars are consequently moved with the greatest ease. The engine working at a high velocity, the cars can be driven at tremendous speed. We should think 100 miles per hour would be easily made; they can be driven as slowly as desired. The invention is designed to be used in carrying mails and express packages, which can easily be done at 100 miles per hour; but electro-magnetism as a motor of small machinery will make the invention more useful and important. The model exhibited shows the road, upon poles set in the curb-stone or edge of the pavement, with safe and easy stairway to ascend to or descend from the cars. The single line of poles supports a double track for cars to run in opposite directions, also the telegraph wires of the different companies and of the fire-alarm telegraph and gas-lamps to light the street. It is made very light, so that it will not obstruct the street, but do away with the old-fashioned street-cars. The cars will run noiselessly, and are the very thing needed upon all crowded thoroughfares. Mr. William D. Gentry, the inventor, is the manager of the Pacific and Atlantic Telegraph Office in Nashville, and is one of the oldest telegraph operators now living. A working model, large enough to carry passengers or freight, will soon be put into practical operation.

A Mighty Railway Project.

THE narrow neck of country lying between the northern and southern continents of America is a decided obstruction to the free flow of modern commerce, and the brains of the best engineers in the world are perplexed with the problem of how to remove it. No less than seventeen different routes for ship canals to effect this object have been suggested within the past half-century, and the labors of surveyors are not yet sufficiently near complete to settle definitely the feasibility of the reverse of slack-water navigation from ocean to ocean. Meanwhile, railway enterprise is invoked to transport ships from side to side of the isthmian region, and a company in London is now soliciting capital to build a railway through Honduras to effect this object. The plan has been elaborated, and the estimates made, by Mr. James Brunlees, an eminent civil engineer, who proposes a track made up of six parallel rails, and having a gauge of 25 feet. The cars to run on this colossal road are to be large enough to carry each a ship weighing, laden, 2000 tons, and having a length of 200 feet. Each one will have 240 wheels, and will weigh, of itself, 700 tons. To get the ships from the water into, or rather upon, the cars, hydraulic lifts similar to those used in graving-docks will be employed. From five to ten locomotives will be required for each loaded car; and, in order to enable them to travel up heavy grades, recourse will be had to the old device of toothed wheels on the engines working toothed supplemental rails provided to the track. As great strength in the track will be required, the six rails of the track proper will need to be laid of iron weighing 120 pounds to the yard. As every thing else is in like proportion, it is not surprising that seventy-five millions of dollars are to be called for to foot the bills.—*American Manufacturer.*

Railway Cars in Europe.

A CORRESPONDENT of the *Railroad Gazette* speaks of European railroads as being superior to ours in many respects. They are better officered, have a better class of employees, with better discipline, greater solidity of track, fewer grade-crossings, more commodious station-houses, etc. But the style of cars in use are decidedly inferior to ours, as will appear from the following extract:

"The European cars, not even excepting those of Southern Germany and Switzerland, are lighter than ours. This may be one of the reasons why broken axles, heated boxes, and broken rails are almost unknown there. The passenger-coaches are about 25 feet long, not any wider than ours, and much lower —not above seven feet in the centre. There are three compartments or sections to each car. First-class in the middle, second-class at each end, third-class generally by themselves. In Germany there is sometimes a fourth-class. The English and continental second-class compartments are upholstered with plush (third-class with morocco or oilcloth,) and carpeted and the seats, of which there are only six in each compartment, placed face to face, have arms dividing them. The Irish second-class have seats for eight in each compartment; and the continental third-class, for ten. The class arrangement has its advantages; there is more room generally; many a mile I had a whole compartment to myself, and still more frequently divided between myself and friend. It is pleasant for companies and acquaintances. It offers privacy and favors exclusiveness. But it is a very expensive arrangement for the railroad companies. It leads to very long trains, and these hardly half-filled; so that, though their cars are much lighter than ours, it is doubtful whether they carry any less dead-weight than we do. On the continent the system is run more economically, because there the officials see that as many places as possible are filled. An English "guard" shares the exclusiveness of his countrymen and respects it; but on the continent sociability is more spontaneous, and travelers are herded more. The compartment system gives a close and confined air to the car. It lacks room and light. The middle seats are not comfortable for seeing or reading; and sitting *vis-à-vis* is as unpleasant under some circumstances as it is pleasant under others. With us, you can choose your *vis-à-vis* company; in England, you can't refuse it. It must be a positive discomfort to many passengers that they are compelled to ride backward. The smoker is well provided for on all the roads, and the smoking compartments are generally well filled. In the continental cars there are ash-boxes provided. Spittoons there are none; chewing is not a reputable or recognized habit, and spitting and putting up one's feet on the opposite seat are peculiarly American. There is no water or water-closet on the train, and, of course, there are no stoves. Every traveler carries a knee-blanket, and, in very cold weather, a bag of warmed sand is furnished on some of the continental lines. It is a continual wonder to an American how the claims of decency, health, and comfort should have been so long overlooked—that the South-German and Swiss railroads have just begun to make a sort of provision for this class of wants. Overhead in each section there is generally a sack for parcels, and under the seat one can stow away a carpet-bag or box. The Englishman is a beast of burden when he travels. He has with him a general assortment of domestic comforts. The continental voyager goes lighter armed. As a class, the Europeans carry much less baggage than Americans, though the Englishman has more parcels. Their "luggage-van" is not half as large as our "baggage-car," but they know nothing of our system of baggage-checks; "'tis true, 'tis pity; and pity 'tis, 'tis true"

Our style of freight-car is found in Holland, Belgium, Prussia, Germany, and Switzerland; but in the British Isles the Englishman, true to his marine instincts, stretches a tarpaulin over his "goods train," and in this, France follows "perfidious Albion." Their engines are not so large, nor so heavy, nor so finely proportioned, nor so elegantly finished as ours are. As a general thing, their driving-wheels are larger and better fitted for speed. Except on some of the German and Swiss railroads, there is no cab for the engineman. He stands in an open box, with an iron or board partition between him and the smoke-stack. This barrier has in it two bull's eyes eight or ten inches in diameter, and glazed. Sometimes this partition is bent back a foot or so at the top, and that is all the protection he and the stoker (fireman) have. Our effective air-brake is not known there. The train is slacked by a man who sits in a little cab at the rear, with a top or side-projecting window, from which he can command the view front and back."

Mexican and California Woods.

THE San Francisco *Scientific Press* says that the idea of experimenting on the woods indigenous to the Lower Coast, the Islands, and Mexico, so as to obtain substitutes for the hard woods and fine fancy woods of the East, has long been present to the minds of many of our most enterprising manufacturers; but it is chiefly to the gentlemen who manage the Kimball Car Company, that is due the credit of showing what a wealth and variety of lumber useful for all purposes of manufacture and highly ornamental, we possess on the Pacific coast. They first made known the fact to the world, in the splendid assortment of woods that they used in building the justly celebrated palace-car, destroyed in the great fire of Chicago, and they are now, and have been for a long time past, engaged in making a series of experiments testing the adaptability of the hard woods of Mexico, and the Lower Coast, to purposes of carriage body, carriage wheel, and wagon manufacture.

The woods are of upward of fifty different varieties, of which we purpose here to mention the principal. We begin with some new to our manufacturers, well known Californian and Oregon wood. The oak is a splendid hard wood, and can be used for a great variety of purposes, such as making barrel-staves, etc. It has not as yet been sufficiently tried for carriage and wagon stock.

Spruce is sold to car-makers, and is taking the place of whitewood. It sells at forty dollars per thousand.

The California maple can be used for nearly all kinds of manufacturing purposes, especially for those of furniture manufacture. It can also be used for wagon-axles.

The California laurel is one of the finest species of lumber in America. It takes a most beautiful transparent polish, exhibiting a series of most graceful wavy lines. It is specially adapted for furniture manufacture, ship-building, and for veneering.

The cocobole, which is found in large forests near the coast, about Acapulco in Mexico, is a beautiful purple wood, and takes a high polish. It is also found in Lower California.

The Spanish cedar is also found in Central Mexico, and is a fine wood for furniture manufacture. It makes beautifnl counters. It can be laid down here at from forty to seventy-five dollars per thousand feet.

The prima vera is, too, found near Acapulco. It is of a light color, much like maple, and, like it, takes a high polish. It can resist the effect of the greatest heats without splitting. It is peculiarly suited to the manufacture of car-panels.

Tomano or perfumed wood, so called from its fragance, grows back on the hills of Central Mexico. It is of a white color outside, and is leather color inside It is used for the manufacture of glove-boxes. An oil is extracted from the tree and from the nut. Only logs have as yet been brought to this city, where they are laid down at ten cents per pound.

The coffee-wood is found in the peninsula of Lower California and in the State of Sonora. It is very hard and heavy, fine-grained, and of a light color. It is finer and tougher than hickory, and is well suited to making carriage-spokes, but not to general carriage or wagon work, as it is too heavy. It is sold here at ten cents per pound.

The ebony is a fine, hard-grained Mexican wood, of a whitish or yellowish color. Enough of this has not been brought to this city to test its value for carriage stock, etc., but it has been used in the manufacture of knife-handles.

The mountain mahogany is found in Lower California, and also in the northern portion of this State, back in the mountains. It possesses all the qualities of other mahogany, and is suited to the manufacture of furniture. It sells at $80 per thousand.

The mesquite, growing in this State and in Lower California, has been used successfully by the Kimball Company in the manufacture of carriage-hubs, and is said by them to be the best yet used for that purpose as it will stand any heat.

The tiger-wood of Mexico is a strong, heavy wood like iron-wood or *lignum-vitæ*, and is, like the preceding, too hard for general carriage work. It can be used, though, for finishing purposes. It derives its name from its color, which is variegated and striped, making a polished section resmbling the coat of the tiger or zebra.

Improved Draw-Bar and Bumper.

THE attention of our readers is invited to an improved Wrought-Iron Draw-Bar Head and Bumper, patented by Messrs. Ross & Arthur, of Freeport, Ill. The nature of the improvement will be apparent by referring to the advertisement and cut on page 15. The head is welded to the bar instead of being riveted, which secures greater strength and durability, and also effects a great saving in the cost of repairs, the difference in this respect being estimated at $4 for each draw-head in favor of the improved plan. It has been in use on the Chicago and Northwestern Railway for a year and a half with the most satisfactory result. Not more than one has broken to fifty of the old pattern, and the road has some 3500 of the new ones in use.

In changing the old pattern to the new one, the old draw-bar can be used if not too badly broken. In fact, any wrought-iron bar that can be repaired at all can be changed to the Ross & Arthur patent, and at a cost as low as to repair the old style bar. If a head on the old style bar is broken, it has to be thrown aside and new iron used in repairing, but in the improved head, if it gets damaged, the cost of repairing is only the labor. In coupling cars, it is much safer and easier than the ordinary bar, as it has a four-inch mouth, and does not cramp the links and pins nor ride the weight of one car on the other. The wide mouth accommodates itself to high and low cars, and does away with crooked links to a great extent, and also prevents the breaking of straight links.

The thickness at the pin-holes is double that of the ordinary bar, which is a great saving in pins, as they will not wear out as fast with a two-inch bearing as with one inch. The head should in all cases be connected with the bar by a solid weld, which makes breakage almost an impossibility.

Further information in regard to this improvement may be obtained by addressing the patentees as above, A model may also be seen at the office of Vose, Dinsmore & Co., 1 Barclay street, New-York.

THE shops of the Buffalo Union Car-Works are about completed, and so much of the machinery is in, that work has actually been commenced, and some freight-cars have already been turned out. The company was organized about a year ago.

MR. H. M. SMITH, four years past Master of Machinery of the Alabama and Chattanooga Railroad, has accepted a position as Master Mechanic of the Evansville, Henderson, and Nashville Division of the St. Louis and South-eastern Railway, having his headquarters at Nashville.

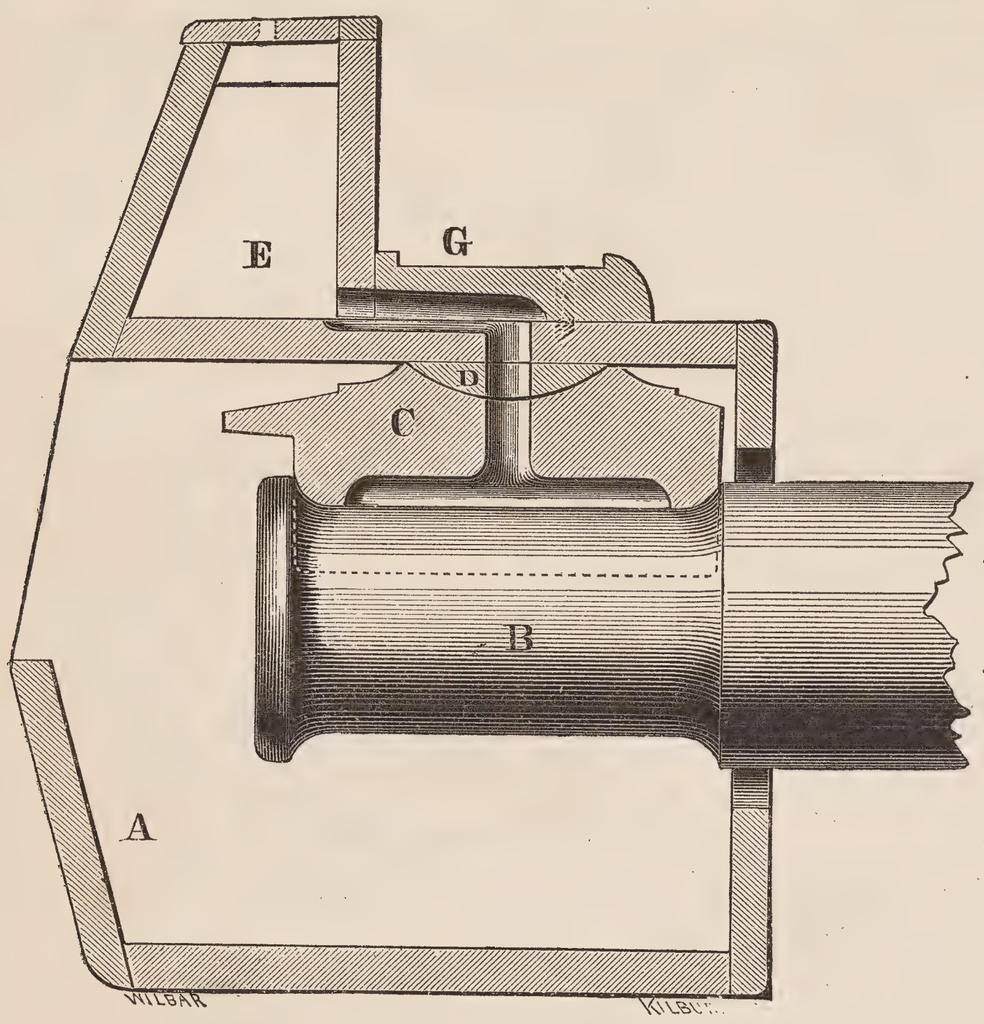


FIG. 1.

Self-Lubricating Journal-Box.

HOT journals are, as every one knows, a chronic trouble in the running of railway rolling-stock, and to obviate which the ingenuity of inventors has been taxed to the utmost. To lubricate a journal so that the lubrication shall be constant and unfailing, without waste of oil or an undue share of attention, are the essential conditions required for overcoming the difficulty which has so long existed.

The plan herewith illustrated, and to which we desire to call the attention of our readers, proceeds upon the principle of applying the oil to the *top* of the journal instead of underneath, as is usually the case. The only difficulty in the practical working of this system hitherto has been the want of some reliable means of applying the oil, so as to prevent waste, and bring it in contact with the journal with certainty and in proper quantity.

Fig. 1 is a sectional view of a journal-box constructed for applying the oil to the top of the journal. E is the reservoir, which should first be half-filled with waste, taking care to fill the mouth of the channel at the bottom which conducts the oil to the bearing and through it to the journal; this prevents too rapid a flow while the car is in motion. There is no flow whatever when the car is not running. The reservoir is then filled with oil, which filters through the waste

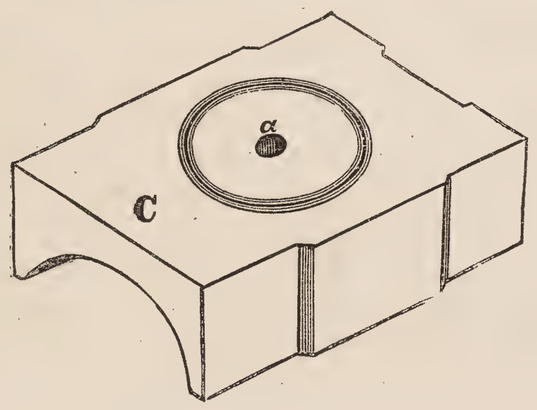


FIG. 2.

and reaches the journal through the channel, as shown in the cut. D is a circular projection on the housing-box, which fits a corresponding concavity in the bearing C, forming a ball-joint, which makes the bearing self-adjusting, and the wearing of it even and uniform No wedge is required. The lower chamber A should be packed with waste to retain the oil which filters through from the upper chamber or reservoir E. It is not necessary to put any oil in the lower chamber after the first packing. Any kind of oil, plumbago, grease, or other substance used for lubricating journals, will be found to work well. If the oil is too thin and limpid, pack the waste closer; if not, take the opposite course. B and G represent journal and equalizing-bar. Fig. 2 is a perspective view of the brass bearing, showing the central concavity forming the ball-joint, and the hole *a* through which the oil passes.

The plan seems to be simple in design and construction, and requires no great outlay in its application. It does not interfere with any improvements that have been or may be made in the lower part of the oil-box for excluding dust or preventing the escape of oil. It applies the oil to the top of the journal where it is needed, and there can be no waste or escape from the reservoir without lubricating the journal and bearing in passing to the oil-well below, where it is retained for service the same as in the ordinary way. The plan effectually secures perfect self-lubrication as long as there is any oil remaining in the reservoir.

The advantages resulting from the saving of labor, prevention of waste of oil, and of hot boxes, are obvious. It is easily applied to passenger or freight-cars, at a small advance on the cost of an ordinary box, and a car will run six or eight times the distance that it will by the old method without stopping to oil. A test of the comparative merits of the old and new style of boxes has been made by running seven cars equipped with each on the same trains together, a distance of 7780 miles, resulting in the consumption of 38 gallons of oil by the old method, and 9 gallons by the new one; or 864 miles to one gallon of oil in the former case and 204 miles to one gallon in the latter. The new boxes are now in use on the Vermont Central; Rome, Watertown, and Ogdensburg; New-York and Oswego Midland; Ogdensburg and Lake Champlain; Boston, Hartford, and Erie; New-York, Providence, and Boston, and Rutland Railroads.

For further particulars address the patentees, Messrs. M. Sessions & Co., St. Albans, Vermont, or A. W. Robinson, sole agent for New-England, Lock-box 739, Providence, R. I.

Adrian Car-Works.

WE copy from the Adrian, Mich., *Times* the following notice of the works of the Adrian Car and Manufacturing Company, located at that place:

"The company employ 385 men in the various departments, and have already expended upward of $32,000 in buildings and machinery during the present year, and propose adding largely to this expenditure before the close of 1872. It has invested in buildings and machinery at the present time nearly $200,000. It has a capacity when worked to the utmost of ten flat or freight-cars a day, and one first-class passenger-coach each week. During the week which closed the month of August it built and shipped 54 cars. It melts and uses thirty tons of iron each day. The price of flat and freight-cars ranges from $650 for the former to $900 for the latter. A first-class passenger-coach costs from $3500 to $6000. The sales of the company last month reached $115,000, and it is estimated that $25,000 will be added to that for the month of September. The sales for the year 1872 will go beyond a million dollars. The company occupies seven large buildings, besides the office and store-houses, kiln, etc. 158 cars were turned out during the month of August. The company used about half a million feet of lumber during the month, 170 tons of wrought-iron, 1280 car-wheels, and 160 tons of other castings. Car-wheels weigh from 500 to 540 pounds each. About 12,000 pounds of brass were used for bearings, and for this brass, as well as for the metal trimmings of the cars, the company is a customer of that other great manufacturing enterprise of this city, the Illinois Manufacturing Company. The customers of the Adrian Car Company are widely spread. A contract is at present being pushed through for the Northern Milwaukee road, for ten passenger-coaches and 100 freight-cars. We saw one of the passenger-coaches, which is nearly completed, and it is a marvel of beauty. The company has completed or is at work on contracts of five passenger and two mail and baggage-coaches, and 100 freight cars for the Mississippi Valley and Western road; six passenger and 600 freight-cars for the Northern Pacific road; four passenger, two mail and baggage, and fifty freight-cars for the Black River and Utica road; one splendid passenger-coach for the Chicago and Canada Southern road will be shipped this week, and the "White Line" cars on the L. S. & M. S. road, of which there are 547, were built by this company. The work turned out by this company is first class in every respect, and in this lies the secret of its success. No poor work is allowed to leave the shops, and every minute detail is carefully attended to. As a consequence, the cars of this company are unsurpassed on the continent for beauty of decoration or perfection of finish. Every department is under the care of skilled workmen. Every portion of the work of building and decorating a car is done by this company except, of course, the fine metal trimmings, and these are provided by the Illinois Manufacturing Company."

"The company is a large purchaser of all varieties of timber which grow in this section, and the oak, whitewood, ash, and black-walnut lumber which they use is largely grown within a circuit of twenty miles of this city."

In addition to the above, we would say that the efficient superintendent of the works, Mr. C. L. Gambell, is a gentleman whose capacity and large experience admirably qualify him for the important position he holds; and the gratifying success which has attended the business, is in a great degree attributable to his characteristic energy and practical acquaintance with its various details, as well as knowledge of the requirements of railway progress in the construction of every class of rolling-stock.—ED. CAR-BUILDER.

Foremen.

IF a foreman is of a kind disposition, possessed of a cool head and good judgment, with a friendly feeling existing between himself and the men under his charge, they need no urging in case of emergency. A cool-headed man is usually possessed of good judgment, and knows how to place men so that they can work to good advantage. Every move counts, and work is rapidly performed without any seeming hurry; whereas the snarly, quick-tempered man will worry and fret both himself and every one around him and accomplish but little. Good nature is indispensable to the successful management of workmen; but it should be accompanied with sufficient firmness and decision to prevent any undue liberties on the part of the workmen.

In the machine-shop, the foreman who has the last mentioned qualifications will have every thing shipshape. Every workman knows what would displease the "boss," and takes especial pains to have every thing in good order. He does his work in the best manner, both for the praise he expects to receive from his foreman and the interest he feels in the welfare of his employers.

When a workman knows that faithful, honest labor is appreciated, he is not slow to take a lively interest in the work in hand, and it is of great importance that individuals or corporations employ no foremen who are continually at war with the men under their charge.—*American Manufacturer.*

A STOCK company for manufacturing cars has been formed at Northumberland, Pa., and the building is now being erected there, 330 feet by 50, with slate roof, on the line of the Lackawanna and Bloomsburg Railroad.

Ohio Falls Car Company.

On the afternoon of March 20th, 1872, the extensive works of the Ohio Falls Car Company, at Jeffersonville, were almost totally destroyed by fire, and a valuable industrial source was thereby temporarily crippled. At that time they were turning out a great deal of much-needed work, and the loss was severely felt in railroad circles throughout the West. The company, with the energy which has always characterized their operations, immediately went to work clearing away the smoking and blackened ruins, giving employment to a large number of their men. They designed new works on a much more extensive scale, and to-day have nearly completed and ready for operations the following buildings :

Foundry, 322 by 88 feet, walls 20 feet high.

Blacksmith-shop, 202x90 feet, 20 feet high, with 48 forges.

Cupola loft, 45x34 feet, 2 stories high, with three cupolas.

Large engine-house, 52x37 feet.

East boiler-house, 41x25 feet.

Iron machine-shop, 113x82 feet.

Wheel and axle-shops, 72x56 feet.

Brass foundry, 35x25 feet.

Passenger-truck shop, 37x40 feet.

Two store-houses for iron, 46x68 feet, and 25 feet wide.

Truck-shop, 72x37 feet.

Pattern-shop, 44x37 feet.

Pattern store-house, 42x37 feet.

Large wood-machine shops, 232x82½ feet.

West engine-house, 38x21 feet.

West boiler-house, 41x24 feet.

Planing mill, 121x37 feet.

Three setting-up shops, 126, 96, and 111 feet by 47 wide.

Three paint-shops for painting freight-cars, 126, 96, and 111 feet long by 42 feet wide.

Two passenger-car setting-up shops, 126 and 106 feet long by 77 feet wide.

Four paint-shops for painting passenger-cars, three 126 feet long and one 106 feet long, all 77 feet wide.

Cabinet-shop, 135 by 82 feet.

Passenger machine-shop, 135 by 62 feet.

North engine and boiler-house, 40 by 40 feet.

There are several store-houses and other buildings left uninjured by the fire, which are also used.

In the past four months, it will be seen that the company has not been idle. In a few weeks, the above works will be running at their full capacity and the company will be ready to fill the large orders which they are constantly receiving from railroads.

A model of the company's yards, which now cover nearly thirty acres, will be placed in the Exposition building next month, which will give a bird's-eye view of their extensive business, and will doubtless be a great attraction. These works are the largest of the kind in the United States.—*Louisville Commercial.*

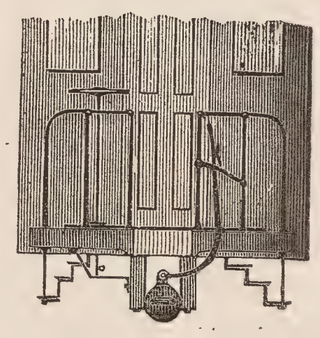
Railroad in Japan.

A correspondent of the New-York *Herald*, writing from Yokohama, says,

"That immense elephant—the railroad—which the Japanese have had on their hands for the last three years, has at length shown some signs of life. After a period of nearly three years since ground was first broken, the line has been opened for a distance of 13 miles. Why it was not opened before for this distance it is difficult to say, unless a reason can be found in the fact that those who had charge of its construction were heartily ashamed of the results of their labors. As before stated, this paltry line—the whole length from Yokohama to Jeddo is only 17½ miles—has been nearly three years in construction. It runs through a country entirely devoid of physical difficulties; labor is plentiful and cheap; money and men have always been on hand. It is a single-track road—3 feet 6 inches gauge—and the only perceptible result of all this is a line in working order of 13 miles in length, and it has cost very nearly $120,000 per mile. Where the money has gone to, it is hard to say, but there are the figures. The road was opened to the public on the 13th inst. There are first, second, and third-class cars. The two first-mentioned cars are something like our street-cars, only they are narrower and in every way smaller. The first-class cars are divided into three compartments by sliding-doors, and carry twelve persons comfortably. The second-class cars differ from the first only inasmuch as they are not subdivided, and are furnished with cane seats instead of leather ones. The third-class cars look like diminutive cattle-cars, with wooden benches in them. A train in motion looks very much like a huge, clumsy toy. Still it is not nearly as bad a road as it was expected it would be. Although one gets a considerable shaking in the thirty-eight minutes' ride, the cars run much smoother than I ever dared hope they would. There is an immense number of officials attached to each train—each car will average two—for what purpose I can not say, unless it be to display the brass buttons worn by each of them. They run at a speed of about twenty-two miles an hour. Since the road has been opened, th as done quite an amount of business, its receipts average about five hundred dollars per day. The tariff is ridiculously high: First-class, $1.50; second-class, $1; third-class, 50 cents. I have been told that these rates will be reduced very considerably on the first of next month. As to the time when the line will be opened all the way to Jeddo, I am loth to venture a prophecy; but, judging from the past, I should be inclined to suggest about the early part of 1874. If Japan has to pay for all her contemplated railroads in the same ratio as she has paid for this, I am very much afraid that some time will elapse before any distant points are connected in this manner."

Improved Platform and Coupler.

The engravings illustrate a continuous Platform and Automatic Car-Coupler, patented by Mr. R. A. Cowell, of Cleveland, Ohio. The design of the invention is to supersede the old-fashioned, telescoping, man-killing platforms, and at the same time avoid the increased weight of other improved platforms in use.



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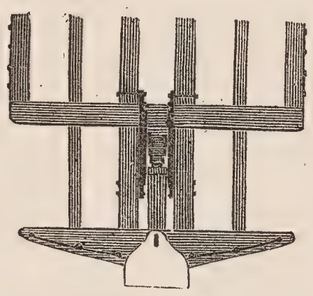

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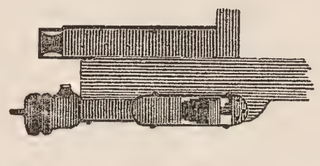

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Fig. 1 is an end view of the car with coupling, and lever attached for uncoupling. The fulcrum is on the end rail, and a ratchet-bar near the handle of the lever keeps it in a position for raising the coupling-pin. The usual jar of the cars in coupling will cause the pin to drop at the proper time. Fig. 2 is a top view of the platform with shield working on a ⅞-inch bolt in a slot 4 inches long, and clasping the end rail of platform. Two rubber springs, 4x5½ inches are in the shield on the outside of rail. The shield is of ½-inch boiler-iron, and forms a close continuous platform as well as buffer. Fig. 3 shows the springs in the shield, and that the platform timbers are in line with the top of the floor timbers; also the draw-bar, which can be attached to the draught rigging of an ordinary car. The rubber on the link keeps it in a parallel position at all times, thus producing a better result than has been obtained heretofore.

This device has been subjected to a severe test within the past year on the Cleveland and Pittsburg Railroad, under the supervision of the superintendent and master car-builder, and with the most satisfactory results. Last of all, it was placed on the baggage and passenger-cars of an accommodation train between Cleveland and Alliance, a distance of 57 miles, making round trips daily and subject to much heavy pounding. On one occasion, in consequence of a mishap, the cars were brought together with a force equal to forty tons, and, to the surprise of every one, not the least fracture was visible in platforms or cars; and a thorough inspection at present shows that every part of the platform is in as good condition as when first made.

The appliance costs less than $100, and adds less than 100 pounds to the weight of a car over the ordinary platform, and will also resist a heavier concussion than any other in use, without damage to the cars. Further information may be obtained by addressing the patentee as above.

The Whistle Nuisance.

A correspondent of the New-York *Evening Post* writes as follows :

"The country is covered with a net-work of railroads. The cars run by a multitude of houses. In these houses—it might be well enough to say are people who have ears—but in these houses, take the country through, are many persons who are ill and suffering, ill with nervous diseases, in delicate and perhaps critical situations, where rest or sleep, it may be, is the only chance of life. And now come by, every hour or two, these railroad whistles, making the most nerve-racking, the most horrible noise heard on earth. Thunder is music to it; the cotton factory as the buzzing of flies in comparison. It is the most distracting, ear-splitting, anger-provoking shriek ever heard out of Bedlam. If the engineers were demons sent to torment us, they could hardly do it more effectually.

"Is this necessary? Not in the least. The whistles need not be blown so loudly. By some of the engineers they are not; while others put on steam and make such a noise as nothing but steam can make. But this is not the point. The whistles can be pitched in a lower key and be made to give a low, deep sound instead of that frightful combination of shrieks which now occasion such distress. Is it not possible to call the attention of railroad managers to this subject? If not, the question is submitted whether petitions might not be addressed to our legislatures, asking them to abate this intolerable nuisance. Enact a law that all railroad whistles shall be set in a low key. That could be done, and it would give relief."

Railway Operatives Paid by the Hour.

The Chicago, Rock Island, and Pacific Railroad Company has made an interesting experiment which, by its successful result, seems to have solved the labor question, so far as that corporation is concerned. Several months ago, the superintendent initiated the plan of paying the employees of the company by the hour. The mechanics in the shops of the company were all paid by this standard, while engineers and other train men were paid according to the number of miles they ran. The latter plan, although obviously liable to produce inequalities of compensation, is said to have worked satisfactorily, so that in busy seasons the engineers made as much as $150 a month. In the shops, the men were employed all through the season, but worked a reduced number of hours, while in slack times they were also employed fewer hours, instead of being discharged. At first, some of the workmen objected, but a trial of the scheme is said to have convinced all of them of its fairness. It affords the corporation a perfect protection against strikes, and removes all causes of ill-feeling between the employers and employed. To some extent the same mode of payment is practiced by the Reading Railroad Company. The brakesmen, and probably the engineers and conductors, are paid by the number of trips made.

Oct. 1872

Hitchcock's Car Ventilator.

To devise means for the thorough and satisfactory ventilation of railway passenger-cars, and at the same time exclude cinders and dust, is a somewhat difficult thing to accomplish. Various plans have been devised and subjected to practical test, but have failed more or less in meeting the requirements of that portion of the traveling public who are averse to breathing unwholesome and impure air.

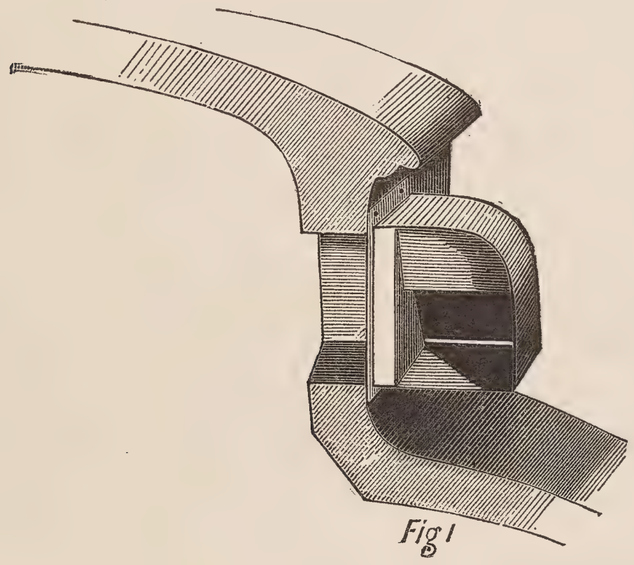


Fig 1

Our attention has recently been called to the device represented by the engravings. Mr. Robert Hitchcock, of Springfield Mass., is the inventor and patentee, and Messrs. H. D. Carroll & Co., of the same place, are the proprietors and manufacturers. It has already been adopted on various roads in different parts of the country, and especially in New-England; and so far as we can learn, it has received the unqualified approval of railroad men and the traveling community. Owing to its peculiar internal construction, it is difficult to give as clear an idea of its details by an engraving as could be obtained from a model or the ventilator itself; but with a little assistance in the way of explanation, the reader will be able to understand the *modus operandi* of its working.

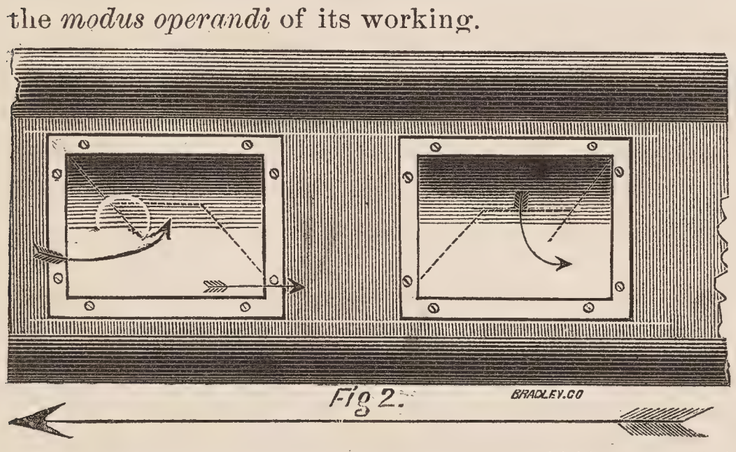


Fig 2.

The ventilators are placed as usual in the car roof as shown in Fig. 1, their mouths facing alternately in opposite directions, those facing forward admitting the air, and those facing backward affording an exit Fig. 2 represents a side section of the raised roof with two of the ventilators alternately arranged. When the car is moving in the direction indicated by the arrow, it will be seen, by the curved darts, that there is an ingress and egress of air constantly taking place. The operation of the ventilators is reversed with precisely the same effect, when the car moves in the opposite direction. The internal structure is such that the dust and cinders passing into the mouth of the ventilator are intercepted by striking against two shields, shown in Fig. 1, and indicated by dotted lines in Fig. 2, and are thus naturally thrown to the bottom, where they are carried out through a small opening as shown in Fig. 1, and by the straight dart in Fig. 2, a current of pure air being forced into the car at the same time through a lateral opening. The faster the car moves, the greater is the quantity of air admitted and expelled, thus securing a free circulation which does not subject the occupants to a direct current or draught. The ventilator is also noiseless in its operation. There is no clattering of valves, and no change is necessary when the car reaches its destination. Once put in place, it is always in readiness, and runs itself independent of all employees.

Objections can doubtless be raised to some of the features of this plan, but we shall not anticipate them, as we think they are not very important. It secures the main thing, which is ventilation; and is approved by some of the best and most experienced car-builders in the country, one of whom informs us that he has put it on more than three hundred cars, and has never had a complaint, and that he always uses it when he can. The proprietors offer to send them when ordered, and if they do not give satisfaction, they may be returned.

Recent Patents.

STREET-CARS.—John Stevenson, of New-York City.—This well-known street-car and omnibus builder, whose passenger vehicles may be seen in nearly every country on the globe, has recently received patents for various improvements in their construction which consist as follows: The first invention relates to securing the metallic connection between the running gear and the body of the car, which is accomplished by interposing rubber or other elastic material between the parts so as to reduce the discomfort experienced by passengers from the noise of the wheels, the clattering of the parts, and the jar occasioned by applying the brakes. The next improvement consists in making the axle-journal without a shoulder and placing a spring-check at its end, by which arrangement, as the car is forced from side to side through inequalities in the track, the concussions are relieved by means of the spring-check. The third invention provides means for securely holding and fastening the caps of car-axle journal-boxes, and the fourth improves the construction of car-brakes so as to simplify the same and facilitate repairs.

ELASTIC PACKING FOR CAR-WHEELS.—J. N. Farrar, Trumansburg, N. Y.—The invention has for its object to furnish an improved packing for elastic carriage and car-wheels, composed of rubber and paper. The packing, composed of blocks of paper and rubber, is interposed between the tire and hub portions of a metallic wheel, and may be used in any wheel suitably constructed to receive it, several of which are patented. The inventor does not claim the use of paper or rubber singly or separately in wheels; but claims, 1st, constructing a combination elastic packing by interposing rubber between two or more blocks of paper, substantially as and for the purpose specified; 2d, interposing rubber between the ends of blocks of packing, as shown, for the object set forth; 3d, the combination of blocks of paper with rubbers and bolts, substantially as described.

RAILWAY-CAR BRAKE.—K. Exter, administrator of K. Exter, Sen., deceased, Munich, Bavaria.—This invention consists in a novel combination of brake mechanism, whereby the brake-blocks or friction-shoes of the brake are forced against the wheels of the vehicle by a weight or spring, through the instrumentality of levers, subject to the control of the draw-bar or traction device, that has a counteracting or releasing effect upon the brake, which is a self-acting one, yet controllable by hand, the friction-shoes or blocks being only automatically forced against the wheels whenever the operating weight or spring is free from the counteracting effect of the traction. The invention also includes means whereby the friction-blocks or shoes are made automatically adjustable, to meet the exigencies of wear and tear.

RAILWAY-CAR BRAKE.—K. Exter, administrator of K. Exter, Sen., deceased, Munich, Bavaria.—The object of the invention is to reduce the labor of applying the brakes; and the invention consists in a brake-motion which is controlled by a weight carried by a lever or swinging-arm, so set or arranged that when it is desired to apply the brakes it is only necessary to start the weight that controls them over the fulcrum or centre of the lever which carries the weight, and whereby hand-power may be combined with the weight to regulate the controlling force of the latter on the brakes.

RAILWAY-SIGNAL.—Joseph F. Andrews, of Nashua, N. H.—This invention has for its object to provide an improved practical means of operating signals at railroad crossings by the trains that approach such crossings and at a suitably safe distance therefrom, to give timely warning to persons approaching the track when the trains are crossing. The invention consists in the arrangement of a vertically movable rail set on springs, which is crowded down by the weight of the train passing over it, and connected with the signal, moving the same when depressed.

RAILWAY-CAR.—A. V. Ryder, New-York City.—The object of this invention is to provide a railway-car of given length double the ordinary sitting accommodation provided in a street-car of usual construction, without materially adding to its width, or greatly adding to its height. To this end it consists in a novel construction of the car in three compartments, and arrangement of the seats therein, whereby the desired result is obtained.

Louisville and Nashville R. R. Cars.

Two splendid passenger-coaches have been completed at the car-shops of the Louisville and Nashville Railroad, and fifteen more passenger-coaches are now on the stocks, in various stages of completion. We also noticed a number of freight-cars in course of construction. In addition to a large number of other cars, six magnificent Pullman palace-cars have been turned out at the shops during the last eight months, at a cost of from $12,000 to $20,000 for each car. They are equally as fine in appearance, and more substantial than those built at the East. Actual use has long since demonstrated the substantial quality of the work done in these shops, and it has acquired a very high reputation.

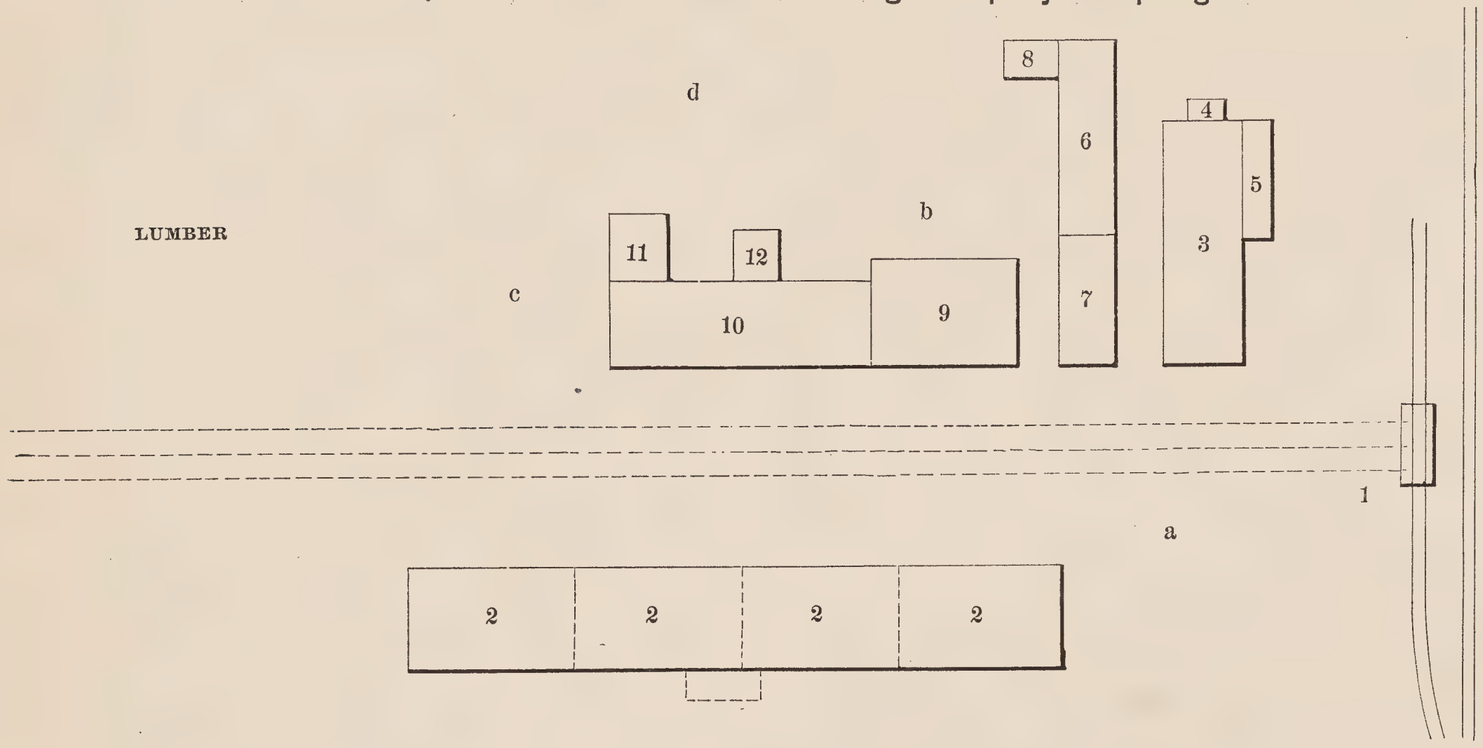
In the machine-shops, Mr. Perkins has two new engines under construction, and expects to have one of them completed in a short time. The company have several engines, built in their own shops, running on the road, which embrace the utility and durability of eastern-built engines, and have decidedly a better finish and a more beautiful appearance. In addition to this, there is a very large amount of work going on in the way of repairing and remodeling cars and engines, and hundreds of men are given constant employment, and a fortune is paid out each week in wages.—*Louisville Commercial.*

Safety Attachments to Car-Platform.

EARLY in September, the attention of various railroad companies having lines of travel in Ohio was called by Commissioner Wright to the act of the last Legislature, requiring that all passenger-cars be supplied with such platform attachments as will secure the safety of passengers from accident. The law, which took effect September 1st, required the Railroad Commissioner to attend to its enforcement. Responses have been received from the managers of nearly all the leading lines of road to the effect that arrangements are in progress by which the law will be complied with. Time is required to secure the manufacture of whatever apparatus is adopted in each case, and in some instances officers of the roads have appealed to the Commissioner for delay, for the reason that they had been ignorant of the existence of the statute referred to. In all cases where there is a disposition manifested to comply with the law as early as practicable, legal proceedings have been dispensed with. It is anticipated that all the roads doing business in this State will be able to show a substantial compliance with the law at an early day.

THE survey of the railway along the Nile is completed. The line is about six hundred miles in length; commences at Wady Kallah, near the second cataract, and terminates at Chartum, where the Blue and White Nile unite their waters above the sixth cataract. For nearly three fourths of its length the line will be on the edge of the valley, about three fourths of a mile from the river, and above the level of the periodical inundations.

The New Shops of the Wason Manufacturing Company at Springfield.



1—Transfer Table.
2—Paint Shop, 500 × 75.
3—Foundry, 170 × 62.
4—Cupola Building, 18 × 36.
5—Fitting House.
6—Blacksmith Shop, 150 × 45.
7—Machine Shop, 2 stories, 100 × 45.
8—Iron House, 36 × 24.
9—Passenger Erecting-Shop, 117 × 75.
10—Wood Machine-Shop, 2 stories, 200 × 62.
11—Wing, 2 stories, 60 × 65.
12—Engine and Boiler-House, 2 stories.
a—Office Buildings, to be erected.
b—Truck Shop, to be erected.
c—Lumber Shed, to be erected.
d—Freight Erecting and Paint-Shops, to be erected.

THE old works of this well-known company are situated in the central part of the city of Springfield, Mass., and cover an area of about six acres. The business was established in 1845 by the late Thomas W. Wason, and has grown from a comparatively small beginning to such magnitude that a new and more convenient location has become absolutely necessary. With a view to the construction of new shops, about seventy acres of land were purchased some time since on the line of the Connecticut River Railroad, midway between Springfield and Chicopee, and about a mile and a half from the present works. The site selected is a very favorable one as regards room for future expansion, shipping facilities, and all necessary conveniences for carrying on the business with economy and dispatch. During the past year, the company has been actively engaged in erecting new buildings, which are now nearly completed, but will not be in readiness to begin operations before next spring. The main structures are all closed in, but much inside work has yet to be done preparatory to putting in the machinery and fixtures.

The general plan and arrangement of the new shops, so far as we can judge from personal inspection, are as complete as long experience and a thorough practical knowledge of the business could make them. With ample capital, and hampered by no special conditions or limitations, every requirement has been provided for and every want anticipated, so that the new works, when completed and in full operation, will be a model of their kind. In order to give our readers some idea of the general plan, we insert a diagram showing the relative position and size of the buildings already constructed. A few others of minor importance are yet to be built, including an office, freight erecting-shop, lumber-shed, etc. Those already erected are all of brick and very substantial. We will briefly allude to the leading features of each, omitting the dimensions, which may be seen by a glance at the diagram references above.

The Paint Shop has a raised central or deck-roof with swing-sash windows the entire length, affording abundant ventilation, and together with the side windows in the body of the building, plenty of light—two very essential requisites of such a shop. The building is intersected by three fire-walls dividing it into four equal sections or divisions, with room for eight passenger-coaches in each. In connection with this shop and outside of the main wall, is an underground vault for the storage of oils, paints, and combustible materials of a like nature, with the entrance protected by a heavy iron door.

The Foundry also has a deck-roof with good light and ventilation. The central height is 35 feet. Adjoining, and under the same roof, is a fitting-house also a cellar protected from the frost and capable of holding a year's stock of moulding sand. At the northern end are four cupolas with a capacity for melting 40 tons of iron per day. In the rear of the foundry are to be the coal-sheds and a flask and iron yard.

The next building is the Blacksmith and iron Machine-Shop, a space of 25 feet intervening between it and the foundry. The blacksmith shop is in the rear, has a deck-roof of the same style and height as that of the foundry, and 33 fires, also an adjoining wing to be used for an iron-room. The machine-shop is in front, and two stories high, the second story being designed for a tin and a pattern-shop.

Twenty-five feet west from the machine-shop is the Passenger Erecting-Shop, containing five tracks, the capacity of which may be judged from its dimensions as shown in the diagram. In the rear of this shop an additional building is to be put up for erecting trucks.

Adjoining and on a line with the passenger erecting-shop is a two-story building, 200 feet long, called the main shop, with a large wing at the western extremity. The lower floors will be occupied by the heavy wood-working machinery, and the second floor of the main building by the lighter machinery and for cabinet work. The second floor of the wing will be devoted to upholstering and varnishing. The central wing, as shown in the diagram, is also two stories, the lower one containing the engine and boilers, and the upper one ,divided into two compartments, will be used, the one over the engine for veneering, and the one over the boilers as a drying-room for cabinet-work.

The engine is from the works of the Providence Steam-Engine Company, has a cylinder 18x48, with Green's patent cut-off, and is rated at 125 horse-power. The fly-wheel is 14 feet diameter and 32-inch face. The steam will be supplied by three boilers of the locomotive tubular pattern, rated at 75 horse-power each, only two of which will be used in the summer.

In the rear of the main shop will be the freight erecting and paint-shop, a building not yet constructed. West of the main shop is an unoccupied area of ten acres, more or less, which will be used as a lumber-yard with avenues and tracks running through it so that every pile can be reached by a car. Between the west end of the main shop and the lumber-yard, will be a lumber-shed 40x200, with a bridge connecting the second story with the second floor of the main shop so that lumber can be run into the latter without hoisting.

The location of the Transfer-Table and track, and its relation to the various shops and lumber-yard, are apparent from the diagram. Beginning at the Connecticut River Railroad and extending to the lumber-yard, it affords facilities for transferring cars and material to any desired point. The pit is 45 feet in width,with a space of 70 feet between it and the paint-shop on the south side, and a space of 33 feet between it and the shops on the opposite side. The table itself is something of a novelty. It was designed and built by Mr. W. H. Paige, the Superintendent of the works, who has a high and well-deserved reputation as a skillful mechanic. It is constructed entirely of iron, weighs about nine tons, and can easily sustain a weight of 300 tons. The table will be worked by a 12 horse-power rotary engine attached to and moving with it, the power being applied by means of a pulley and stationary chain made fast at each end. This apparatus, however, is not yet in place, and we can only convey a general idea of its method of working.

An ample supply of water is obtained from the Springfield Aqueduct, and hydrants are located so as to be used with effect in an emergency. All the shops will be heated by steam and lighted with gas. There will be little necessity for using gas, however, in the daytime, as the windows and roof-lights are so numerous that the daylight finds its way into every nook and corner. A good deal of new machinery will be put in in addition to that now in use at the old works.

The estimated capacity of the new works when completed, is one passenger-car and ten freight-cars per day, exclusive of any number of car-wheels and other castings not estimated. This increased capacity will enable the company to add to its already enviable reputation. The character of their work has always been such as to meet the requirements and necessities of railway progress in its rapid expansion and development. We conclude our present notice by acknowledging the kind attentions of Mr. Fisk, the President of the Company, and Mr. Paige, the Superintendent, in affording us the information herein contained.

THE Ramapo Works is turning out 270 car-wheels daily at the foundries, and boring, turning, and fitting 80 pairs daily in the machine-shops. There are orders in for nearly 20,000 wheels.

SEVERAL new and handsome coaches have been received on the Northern Pacific Railroad, which in point of elegance will compare with the finest passenger-cars now made.

Correspondence.

The Pullman Palace-Car Shops at Detroit.

EDITOR OF THE NATIONAL CAR-BUILDER:

DEAR SIR: A few weeks since, I had the pleasure of visiting the Pullman Car-Works, at the above-named place, and I send you herewith a brief account of them, thinking it may be of some interest to your readers. The reputation of the passenger-coaches of this company is so well established, and their luxurious accommodations so widely appreciated, that they are to be found on all the leading lines of road in the country. Some of the great through lines run from 18 to 24 of them daily. Much as is said, however, in praise of their elegant design, construction, and finish, but few comparatively of the thousands who travel in them have any definite idea as to where and how they are made.

The shops of the company at Detroit are located at the intersection of Croghan street and the Detroit and Milwaukee Railroad, and were formerly known as the works of the Detroit Car and Manufacturing Company, a controlling interest in which was purchased by the Pullman Company about two years ago. Most of the old buildings have since then been replaced by new and more commodious ones. At the time of my visit, the new structures were not all completed, the only ones remaining unfinished being the

paint-shop, store-house, and office. All the shops are designed and built with special reference to the construction of their class of coaches, and all the improvements that a large experience could suggest have been introduced and made available. The machinery is all contained in a substantial three-story brick building, 200 by 85 feet. The heavy wood-machines, engine and boiler, and iron machines are on the first floor. The engine and boiler-room, 18x85, is centrally located between the two machinery rooms. The engine has a 20x40-inch cylinder, and with its fixtures weighs 32 tons. It was built by Messrs. Harvey & Son, of Detroit, has an automatic movement, and is said to be equal to a Corliss engine of 150 horse-power. Under the floor are three pumps arranged so as to be controlled in the engine-room, and one or all of them can be used in connection with one or both boilers as necessity may require. The engine-room flooring is alternate cherry and walnut, an elegant brass-mounted hand-railing surrounds the engine and pumps, and every thing has a neat and finished appearance, so much so that to gain admittance you must use the door-mat and throw away the last quid of tobacco. The two boilers are of the Root pattern, 108 horse-power each, and are placed at opposite sides of the room, facing each other and leaving space for fuel, which consists mainly of chips and shavings conveyed from the wood-working machines and cabinet shop by means of Gannon's duster. On the second floor are the light wood-working machinery, tin-shop, pattern-shop, a room for storing patterns, and a drying-room, the latter located over the boilers. The third floor is used for cabinet work, carving, gilding, and varnishing. The cabinet department is replete with every appliance required for the work, and is probably one of the best appointed shops of the kind that can be found in any establishment. The second and third floors are reached by broad stairways, and also by an elevator of sufficient capacity to convey material and work with the utmost facility.

The Blacksmith-shop is a one story-building, 60x85, with a frame building adjoining for storing iron and steel. There is also a fire-proof storehouse, 14x85, two stories high, and divided into four rooms, in which are kept paints, oils, varnish, and other combustible materials.

The Erecting-shop is a one-story brick building 335x85, with flat roof and containing 16 tracks. A good light is afforded by sky-lights placed at proper intervals, aided by whitewashed ceilings. 35 feet of the west end of the shop is two stories, the second floor being used for upholstering and painting head-linings. There is probably no part of the interior finish of a passenger-coach that requires more thorough artistic treatment than roof-linings, and the Pullman company has done much toward improving their standard of excellence, by employing designers of superior skill to furnish patterns that are not mere machine-work and vagaries of the fancy, but highly artistic in effect, color, harmony, adaptation, and finish. The same designs are not repeated so as to become monotonous, but are infinitely varied. Some of these linings cost at the rate of $500 per car.

Directly opposite the erecting-shop, and with space enough intervening to transfer the largest palace-car, is the paint-shop, 210x75, and of the same style of architecture as the former. It contains 12 tracks. Asphalt flooring is used in both these shops, and is made as follows: A solid surface is prepared of sand and gravel upon which floor-timbers, 3x3 inches, are laid about 16 inches apart. The intervening spaces are then filled up level with Wilkins's asphaltum, and a pine flooring laid on top of all. This floor has been tested by raising the end of a 35-ton sleeping-car by a jack, without making any perceptible impression on it.

Continuous with the paint-shop is the store-house, 70x75 and two stories high, where the general supplies for the construction department are to be kept. Next adjoining is the office building, 35x75, still unfinished. It is provided with a fire-proof vault for the safe keeping of valuables, and will be fitted up and furnished in a style that will rival the best of the palace-coaches in elegance. A drying-kiln, 12x60, is used for drying material, and a large steam-drying boiler is contemplated, which will be a manifest improvement on the old methods.

The means used for transferring cars from the erection to the paint-shop is deserving of particular mention, as it is rather a new thing in car-shop appliances. This plan does away with the heavy, unwieldly transfer-table, and admits of a clear level space with no pit to be filled with water, snow, or rubbish. It also works a saving of expense and labor in other respects. This new method is a shifting-truck, or rather two trucks combined, by the use of which a car can be shifted from the track on which it stands to a track at right angles with it, the whole process, with the aid of two men at the levers on the truck, being completed in thirty seconds. A level surface track runs the whole length of the yard between the shops, crossing the shop tracks at right angles. By the use of frogs, the shifting-truck is placed under the car in the shop, then by the use of a rope and snatch-block worked from a shaft running across the yard, the car is run out to the long cross-track, when the shifting is made, and by the rope and block it is run to any track required. The fact that this company has been using this method for a considerable time is a sufficient evidence of its utility. Mr. P. H. McWilliams, the head draughtsman, is the inventor and patentee.

The cars in the shops at the time of my visit, consisted of two hotel-cars and two parlor-cars nearly finished, and also eight sleeping-coaches in various stages of progress. Besides the large quantity of palace-car work constantly in hand, the company have found time to build two steel cars for Doctor Lamothe, the work being done under his supervision. He seems to have great faith in the ultimate success and general adoption of his plan of building cars, and if the results are what he anticipates, his faith is well founded. To a mere indifferent looker-on, his car is not a thing to fall in love with at first sight, but facts and figures will in due time demonstrate to a discerning public the advantages of the new plan. The doctor claims that a few of the many advantages consist of a diminished gross weight of two tons to a car, and 200 cubic feet more available space inside than an ordinary car has of the same outside dimensions. The lack of space and a sufficient knowledge of the complicated details, will prevent any further description at this time.

As regards the Pullman cars, it would be a waste of time to describe what is so familiar to railway men and the general public. It is sufficient to say that the cars built at the Detroit shops are of four classes, the hotel or commissary-car, the parlor-car, the drawing-room sleeping-car, and the regular sleeping-car; and as regards construction, design, and workmanship, every part, from wheels and axles to the finest and most delicate ornamental details, is as perfect as the best mechanical skill can make it—indeed, I feel warranted in saying that the cars turned out here are positively better than the same style of cars made elsewhere.

I must not omit to mention a new material which is used here altogether for finishing the inside woodwork. It is put on the wood as soon as the carpenters have finished, and in five hours it is perfectly dry and ready for use. It is cheap and durable, has a smooth surface, takes a high polish, and is a great improvement on the old system of filling, rubbing, oiling, and varnishing. It originated with Mr. John Sands, a painter in the employ of the company, and has been patented.

The works employ a force of 450 men of different trades, the majority of whom are skilled mechanics, and many of them are experts in their respective callings. The average capacity of the works hitherto has been about 55 palace-cars of different kinds per year, but it will be increased to not less than 100 per year when the improvements and extensions to the shops are completed. No expense seems to have been spared to render the works as complete as possible, illustrating the maxim that the end justifies the means.

I desire in conclusion to express my obligation to the manager, Mr. C. F. Allen, for attention during my visit. A gentleman of more attractive and genial personal qualities, or more admirably fitted by experience and capacity for the responsible position he holds, could not easily be found. Mr. A. Klohs is the superintendent, having recently accepted the position. I am also indebted to Mr. McWilliams, the accomplished draughtsman, for information herein contained.

MACK.

Station Indicator.

"PLAINFIELD!" shouts the brakeman; or was it Cranefield, or Brookfield, or Fairfield, or Litchfield, or Richfield, or Bloomfield, or Weathersfield?—for we didn't exactly catch the first syllable, there being a shock and a rumble coincident with its utterance. And a lady behind seems not to have caught either syllable, for she anxiously asks, "What station is this?" to say nothing of that older lady with a basket and a bandbox on her lap, who asks, (as she has asked at every station), "Is this Boston?" So, the ears not being trustworthy on a moving train, why not use our eyes? especially as words addressed to them may be kept before them all the time between two stations, while we can not expect, and certainly do not want, the brakeman to be crying out all that time.

The engraving shows so clearly that description is superfluous, a station indicator which is manufactured by V. D. Perry & Co., in Hartford, Ct. A gong bell is attached to each, which strikes when indicators are changed. For instance, when we leave New-Haven, on the Hartford and New-Haven Railroad, the indicator reads, "North-Haven," which is the next station north.

Having passed North-Haven, the brakeman takes down this indicator, and puts up one which reads, "Wallingford," at which time the gong strikes, and we all look up and see what station we will next stop at; and such of us as are going to get off at Wallingford gather up our canes and umbrellas and parasols and bundles and satchels and newspapers, and get ready to leave the car as soon as it stops. The manufacturers are also the proprietors of the patent, and are prepared to sell the right to manufacture as well as the completed indicators to railroad companies.

These indicators are now in use on the Hartford, Providence, and Fishkill, the Connecticut Valley, and the Hartford and New-Haven railroads.—*Railroad Gazette.*

Two palace-cars, seven express-cars, and one hundred and fifty stock-cars were constructed in the Pennsylvania Railroad Company's shop at Altoona, during the month of August.

The National Car-Builder,

PUBLISHED MONTHLY,

BY

VOSE, DINSMORE & CO.,

1 Barclay Street, New-York; 52 Fifth Avenue, Chicago; 713 North Second Street, St. Louis.

Terms, 50 cents per Annum.

Editorial Announcements.

Correspondence.—*We cordially invite the coöperation of the railroad public in affording us the material for a good mechanical paper. Articles relating to rolling stock and machinery, by those practically acquainted with those subjects, will be gratefully received. All communications must be addressed to Vose, Dinsmore & Co., No.* 1 *Barclay Street.*

The name and address of the writer must accompany all communications designed for publication.

Advertising Rates.—*For one square, or one fifth of a column,* $5 *per month, or* $50 *a year. For half a square,* $3 *per month, or* $25 *a year. Larger advertisements by special contract.*

All communications in regard to advertising should be addressed to L. F. Dinsmore, *Post-Office Box* 4055, *New-York City, who is our agent for advertising, and authorized to make contracts, collections, etc.*

Engravings and Illustrations.

We would invite the attention of Master Car-Builders and others to the advantages to be derived from publishing in The National Car-Builder *engravings designed to illustrate the various features and details of car construction, and especially such improvements as can not otherwise be clearly presented. We will procure cuts to be made in the best manner from drawings or models that may be sent us, and charge only for the cost of engraving, inserting the same in our paper with suitable descriptive details, without charge.*

Heating and Ventilation.

The approach of winter with its keen winds, short days, and a temperature fluctuating between freezing-point and zero, while it relieves the traveling public from many of the discomforts of summer, subjects them at the same time to inconveniences of another kind. The rush for the shady side of the train has already begun to abate, and passengers sit very composedly alongside of closed windows. A few days more will bring into requisition the various kinds of heating apparatus, to say nothing of their necessary counterpart, the means of adequate ventilation. These twin topics have had to some extent a season of rest; but hackneyed as they are, their renewed discussion is now in order, and will doubtless be resumed as vigorously as ever. Opinions as to means and methods are far from being settled, and railway mechanics, philosophers, inventors, theorists, and whoever is anxious to confer practical benefits upon suffering humanity, will please sharpen their pencils and wits and prepare for an active campaign. Difficult as the problems are, and various and conflicting as are the views concerning the proper methods of their solution, we doubt not that continued investigation and discussion will be productive of good results in the end. We do not propose to set forth any special theories of our own touching either topic, but shall at present content ourselves with a suggestion or two in a general way, trusting our readers will feel at liberty to approve or dissent; and in doing so, to give us their views in a shape suitable for publication in our columns.

It is not a difficult thing to heat or ventilate a car independently of any required conditions or modifications. A red-hot stove or two will accomplish the one, and plenty of open windows and doors the other; but to combine the two in such a way as to make sixty persons closely seated in an ordinary passenger-car, as comfortable in all respects as a tenth part of that number in a house-parlor of the same relative size, is a different thing altogether, and must be attained by different methods. A house is stationary and requires less ventilation, the rooms containing fewer occupants, and it is, moreover, less liable to be turned upside down without a moment's warning and set on fire by the contents of a stove, as a car is. What is wanted is a plan that will keep the air in the lower half of the car at a suitable and even temperature, so as to make every individual occupant comfortable, regardless of age, condition, or temperament, and at the same time renew it so constantly as to keep it pure while sixty pairs of lungs are doing their best to contaminate it, and so imperceptibly that no one, not even the two or three nervous invalids sitting here and there, shall be sensible of an unpleasant draught. To devise means for perfectly fulfilling all these requirements, is scarcely possible; but an approximation is no doubt attainable, if it has not already been attained.

On another page will be found an illustration and description of a roof ventilator, which is highly approved, and is in use on a number of roads. There are those, however, who think that end ventilators, properly constructed, may be used advantageously in connection with those in the roof; as the most natural and effective way to get air into a car when in motion would seem to be by an opening near the top at the forward end, with a corresponding opening at the rear end for its exit; for unless it can get out, it certainly will not get in, and it is sure to get in in precisely the same quantity that it gets out. There is a difficulty, however, in arranging end ventilators so as to provide for the admission and distribution of air through the car in such a way as not to produce a perceptible current, especially in the cold season, and thus annoy the passengers. To overcome this difficulty, various ingenious devices have been tried, but we believe that none of them have, so far, been entirely successful. We doubt not that perseverance and persistent effort will sooner or later overcome all obstacles and give us as perfect a system of car ventilation as the nature of the case will admit. In this hopeful mood, we stop for the time being our editorial agitation of the threadbare topic, and promise not to resume it again without reasonable provocation. Our readers, however, are requested to report to us any new and valuable discoveries that may result from their observation and experience, and we will give the same a place in our columns.

As regards the use of the ordinary coal and wood stoves in the body of cars, we think it is high time they were superseded by something more in accordance with the requirements of modern civilization. With their rattling and clattering accompaniments of pipe, pokers, fenders, fuel-boxes, coal-scuttles, etc., to say nothing of badly-regulated draught and the constant liability of passengers to be roasted alive in case of overturn or collision, these antiquated heating machines are unsightly, disagreeable, and barbarous, and properly belong to the by-gone era of snake-heads and the old flat rail.

Car-Springs for Freight Work.

Of the various kinds of car-springs used for freight work, we venture to say there are none that can show a better record of service, with less actual breakage or failure, than the group springs manufactured by Vose, Dinsmore & Co., consisting of a suitable number of small steel spirals with a central filling of India-rubber, inclosed in cast-iron cases, each spiral being adjusted to an upper and lower seat within the case, and thus held securely in position without any possibility of displacement, the group collectively forming a powerful resisting and sustaining mass of combined steel and rubber, elastic, reliable, and durable.

These springs are now running under upward of 30,000 cars, distributed upon the various leading lines of road, without a single complaint or formally reported breakage; but, on the contrary, with unqualified commendation from all quarters. This, it must be conceded, is a very satisfactory performance for springs subjected as these are to the severe service of freight traffic, and especially the wear and tear incident to the transportation of ores and mining products. This result has been attained by due attention to the quality of the two materials of which the spirals are made, and the thorough and careful test to which each one is subjected before leaving the factory.

The above-named firm have the exclusive legal right to make and vend these springs; and all others of similar design and structure, offered in the market, are infringements as well as inferior in quality.

Veneers and Fancy Woods.

The importance and magnitude of this trade are steadily increasing, owing to the constantly increasing demand for articles of ornament and luxury to gratify the tastes of an advancing civilization, and a growing appreciation of the beauties of art and artistic effects. The desire for something more than the mere necessities and comforts of life is manifest among all classes of our population, with the exception perhaps of the lowest strata, who are content to live from hand to mouth, and who are from habit and association indifferent to nearly every thing not actually essential to a bare existence. The wealthy classes are becoming more and more the patrons of the beautiful; and the increasing skill of mechanics, artists, and artisans in producing articles of embellishment and luxury, stimulates a corresponding demand for the products of their industry and invention. A style of furniture and upholstery which would have been considered elegant a few years ago, is now commonplace and ordinary as compared with the style and fashion of to-day; and the cost of furnishing a house in the best manner, according to the recognized standard of fifteen or twenty years ago, would hardly cover the outlay required to-day for mirrors and chandeliers. This state of things has contributed greatly to the activity and extension of the trade in cabinet woods, and especially those varieties used in the manufacture of the finer and more costly articles of furniture which find a place in the better class of dwellings, to say nothing of hotels, public and private offices, steamers and railway cars. Every accessible part of the earth is explored in search of new varieties, many of which have been discovered and brought into requisition. Not a few of our domestic woods, hitherto considered of little value, have been found to possess rare qualities for cabinet-work, revealing the fact that our pioneers and settlers, in their inroads upon our primitive forests, have reduced to ashes vast quantities of wood, the worth of which they were ignorant of, and the actual money value of which, for cabinet and ornamental purposes, can scarcely be estimated.

We set out with the design of calling the attention of our readers to some of the enterprising firms in our city who are engaged in the trade, and whose stock in the aggregate includes the products of all parts of the earth, their supplies being drawn from the East and West-Indies, Africa, South-America, Spain, Hungary, France, California, and our own domestic forests. The use of fine and rare cabinet woods is becoming more and more indispensable in the interior finishing of every class of passenger-cars, and their consumption for this purpose will doubtless be far greater in the future than it is now, as it seems hardly probable that any style or method will be discovered that can surpass in elegance and beauty the effect of rare and diversified woods. A reference to our advertising columns will indicate the kind of stock to be found at the various establishments, to some of which we propose briefly to refer.

Messrs. George W. Read & Co., 170 and 172 Centre street, are prominent importers and dealers in hard and fancy woods, and veneers. They have a large

factory in Lewis street for cutting veneers and sawing. Their stock embraces an extensive variety, including rosewood, mahogany, satin-woods, walnuts, bird's-eye maple, tulip, white holly, cedar, cherry, Hungarian ash, whitewood, plain ash, zebra, ebony, California laurel and redwood-burl, butternut-burl, amboyne, thuya, and other choice qualities, in veneers, logs, and planks, and which can be cut to any required size. We would make special mention of some exceedingly beautiful butternut-burl veneering shown us at the ware-rooms, so exquisite in its delicate texture and fanciful combination of shades and figures as to seem more like the design of an accomplished artist than a production of nature.

Messrs. A. Parker & Co. are also importers and dealers in fancy woods of the choicest kinds, veneers, hard woods, etc. Their ware-rooms are at 166 and 168 Centre street, and their stock embraces the usual variety of imported and domestic woods, including some deserving of special mention. We were shown some beautiful corrugated American ash veneering, the corrugations being produced by a peculiar mode of cutting the log, giving to the surface of the veneers or slices a wavy, undulating appearance which is permanent, and closely resembling, when polished, the Hungarian ash, besides being a great deal cheaper. We were also shown some exceedingly fine specimens of American walnut veneer, surpassing in texture, shade, and figure any thing of the kind we have yet seen; also some very fine specimens of white holly.

Messrs. Joseph F. Paul & Co.'s ware-rooms are at 242 Canal street, opposite Earle's Hotel. Their stock of woods and veneers is extensive, and includes all the varieties known to the trade and suited to the wants of piano manufacturers, cabinet-makers, and car-builders. Their mills contain, in addition to the usual sawing facilities, some of the best veneer-cutting machines in use, and they are constantly receiving fresh importations of desirable woods from abroad. They have on hand a very choice lot of rosewood veneers cut by a new process which makes both sides smooth alike, leaves the wood in a perfectly solid state, and equal if not superior to sawed veneers. They make a specialty of this branch of their business.

Messrs. Willard Hawes & Co., 370 Washington street, have a large stock of sawed and cut rosewood and mahogany veneers, also figured satin, cut bird's eye, curl and blister-maple, and other varieties, besides an extensive stock of rosewood, walnut, cherry, butternut, and chestnut logs and planks. They have a large saw-mill in the city with all the necessary facilities for furnishing their customers with woods in any desired form and shape. They have also a desirable stock of satin-wood and other imported varieties for cabinet and car-building purposes.

In a future issue we shall notice a few other establishments in this line, including Messrs. Cole & Comstock, manufacturers and dealers, 191 and 193 Chrystie st., and Mr. L. Hirsh, importer of French walnut veneers, 175 Canal street.

"The Roadmaster's Assistant."

A SECOND and revised edition of this valuable manual has been issued by the publishers of the *Railroad Gazette*, Messrs. A. N. Kellogg & Co., 72 Broadway. It is compact in form, and may be carried in the pocket as conveniently as an ordinary diary; and as a reliable reference for all having to do with the permanent way of railroads, it is indispensable, containing as it does a great number of practical suggestions and minute directions for track-laying, ballasting, and repairing. It is not designed for professional engineers, being free from technicality, and especially adapted to the wants and capacities of the average track-man, and calculated to aid him in correcting erroneous practices which at present prevail, and which tend to increase the expense of track repairs and liability to accident. It is provided with a copious index, by which ready reference can be made to any particular topic.

To Master Mechanics.

Mr. SETCHEL, the Secretary of the Master Mechanics' Association, requests the members to send their post-office address to him at Cincinnati. It is impossible for the committees to perform the duties allotted to them, and collect information from all the members of the association, unless their circulars of inquiry are properly addressed. All records which may be relied upon for this purpose are more or less imperfect. Early attention to Mr. Setchel's request will materially aid in maturing the work of the association for the next annual convention.

LOOKING-GLASSES, FRAMES, AND MOULDINGS.—We take pleasure in calling the attention of our readers to the establishment of W. A. Willard, 177 Canal street, who is widely known as a manufacturer and dealer in mirrors, frames, mouldings, cornices, and all kind of kindred articles for decorative purposes. A special feature of his business is the gilding of curved mouldings for the interior finish of railway passenger-cars, which is done by a peculiar process of his own, producing a cheap and durable gilding which is not impaired by moisture. He also manufactures a superior style of glass etching for table-tops and other ornamental purposes, the figures varying as the light is reflected from different points of view. Panel glasses for parlor and sleeping-cars, bulletin-boards for time-tables, carving of every style and variety, plain and fancy mouldings, etc., are all to be found at this establishment, whose well-established reputation for fair dealing, courtesy and business promptness, entitles it to the confidence and patronage of the public. A full stock, both for wholesale and retail trade, is kept on hand, and all articles are warranted to be as represented.

Miscellaneous Items.

THE Jackson and Woodin Manufacturing Company, at Berwick, Pa., employ a force of 350 men in the various branches of their business. The works at present turn out 107 car-wheels per day, but their capacity in this respect will soon be very much increased. The car-shop has a capacity of four box-cars per day, or six flat-cars, or fourteen coal-cars. Both wheels and cars are of excellent workmanship and give entire satisfaction. The works consist of frame buildings and cover five acres. A brick building, 54x80, is now being erected for offices and store; also a rolling-mill which will turn out about twenty tons merchantable iron per day, half of which will be used in the car-shop, and the residue by other manufacturers in the vicinity. A switch has recently been put in to connect the works with the Lackawanna and Bloomsburg Railroad.

THE Louisville Car-Wheel and Railway Supply Company was organized a year ago, and turns out some of the finest car-wheels in the country, averaging fifty-six per day, which is barely sufficient to meet the demand of its customers. Besides the manufacture of car-wheels, the company make chilled tires for engine driving-wheels, which have given general satisfaction. The wheels have given more mileage than others, and frequently wear out journals. No better evidence of their strength and value can be given. J. P. May, the superintendent of the works, is a practical workman, and has already demonstrated to the company the value of such a manufactory in this city. The works now consume seventeen tons of pig-iron per day.

DURING the past year, Messrs. Seath & Hagar, proprietors of the car-works at Terre Haute, Ind., have added a new foundry 70 feet square, 16 tons cupola capacity. Their old foundry has 10 tons capacity. They have also added an erecting-shop 60x100 feet, and wood-working shop 80x60 feet. Their capacity is now four cars per day. They employ 150 hands. They are now working on orders which will keep them busy until the 1st of December next. These works use over 2,000,000 feet of lumber, 3500 tons of pig and 1000 tons of wrought-iron, and their sales amount to near $600,000 annually.

THE Ohio Falls Car Company have placed in the Louisville Industrial Exposition a miniature representation of their new car-works. The platform supporting it is an elegant piece of workmanship, having been gotten up regardless of cost, and containing many kinds of wood, including ash, black-walnut, butternut, amboyne, Canada walnut, cherry, pine, linn, and poplar. Over the platform there is suspended a beautiful banner bearing the following inscription: "Ohio Falls Car-Works, Jeffersonville, Indiana, organized June, 1864; destroyed by fire March 20th, 1872; rebuilt, 1872. Joseph W. Sprague, President; William Crichton, Secretary and Treasurer. Directors—D. Ricketts, M. L. Belknap, J. L. Smyser, J. W. Sprague, S. A. Hartwell. Cash capital, $500,000; twenty-six acres of ground; five and a half acres under roof; three and a half miles of track in yard; capacity, twelve freight-cars per day: one hundred passenger-cars per year; H. Walters, architect, Louisville, Ky." The model represents thirty-two distinct buildings, and there is not a more meritorious exhibition in the building.

W. H. HARRISON, who has for many years past been master mechanic of the Baltimore and Ohio railroad shops at Wheeling, W. Va., has been appointed master mechanic of the Pittsburg, Washington and Baltimore road, at Connellsville, Pa. Mr. Harrison's capacity and long experience are a valuable acquisition to the mechanical department of any road.

THE Cincinnati and Terre Haute Railroad Company has received six new passenger-coaches direct from the shops, and over the Vandalia line. These will make up two trains, with the two splendid baggage-cars received with them. These coaches are said to be among the best in the West, and are in harmony with all the rest of the elegant equipments of this excellent line, which will have nothing that is not new and first-class.

THE locomotive shops at Paterson, N. J., are all full of work, and none of them will be able to deliver engines on new orders earlier than January. They are all making additions to their establishments. The Rogers Works has a new boiler-shop, 130x200 feet, nearly completed, and a foundry, 145x110 feet, also under roof. It will be remembered they have quite recently gone into their new machine and erecting-shop, which is quite extensive, and with the additions which are now being made, the capacity of their works will be very much increased. They employ at present about 1200 men.

THE machine-shops of the St. Louis, Kansas City, and Northern Railway at Moberly, Mo., are beginning to assume immense proportions, and are being visited daily by wondering denizens and strangers passing through the city. Part of the brick-work of the machine-shop, one of the largest buildings, is up to the top of the first story; a great amount of excavating for other buildings and side tracks has been done, and a mammoth water-tank, fifty feet high, the timbers resting on solid rock foundation, is nearly finished.

THE Marquette and Ontonagon and the Houghton and Ontonagon railroads have been consolidated, and will be known hereafter as the Marquette, Houghton, and Ontonagon Railroad. It is expected the road will be completed to the Spur Mountain within two weeks or less, and the branch to the Republic mine in about three weeks.

A NEW and profitable branch of business, it is said, has been invented and put into practice in Georgia. There is an enterprising man in Whitefield County who sprinkles salt on the railroad to allure cattle upon the track. The animals are killed by the trains, and the railroad company has to pay for them. The owner has the beef and hide for his profit.

SEVERAL of the horse-cars in Boston, Mass., have a thick slab of corrugated rubber screwed on to the iron steps. This diminishes the danger of persons slipping on entering or leaving the cars. In winter these slabs of rubber, or some other contrivance, seem necessary to prevent accidents to passengers, and they might with advantage be adopted in other cities.

AMONG the heaviest articles probably ever sent by railroad were two immense iron paddle-shafts recently sent from Bridgewater, Mass., to San Francisco. They were nearly forty feet long, twenty-six inches in diameter, and weighed together upward of seventy-one tons.

THE machinery for the new car-works at Laporte, Ind., has mostly arrived, and is being put in position, and it is expected the company will turn out cars this month. They will begin with one hundred hands.

STEEL rails are being put down by the Pennsylvania and Erie Railroad Company at the different stations along the road where the most friction takes place, and will extend as the old iron rails are worn out.

THE Cleveland foundry is being run to its full capacity on car-wheels. Such celebrity has this wheel obtained that they are unable to fill their orders, and the firm have under consideration the enlargement of their works.

THE Kansas Central narrow-gauge road is now completed forty five miles from Leavenworth. The grading is finished eleven miles further.

MR. MYRON E. BROWN, long Master Mechanic of the Buffalo and Rochester Division of the Erie Railway, has been appointed Superintendent of Rolling Stock for the entire road.

A NEWLY-INVENTED smoke-stack and spark-arrester has been put on engine No. 38, of the Chicago and Alton road. In making a trip of 125 miles, it collects ten or twelve bushels of fine cinders, which are easily removed. No sparks or fire are thrown from the engine while in motion.

THE following lines of cars are now running on the Pennsylvania Railroad: Union Line, 1700 cars; National Line, 2500 cars; Empire Line, 500 cars; Pennsylvania Railroad and Alleghany Valley Railroad, 500 cars; Alleghany Valley Railroad Pennsylvania Company, 1000 cars; Allentown Line, 300 cars.

MECHANICS are the palace-builders of the world; not a stick is hewn, not a stone is shaped in all the lordly dwellings of the rich, that does not owe its beauty and fitness to the skill of the mechanic. The towering spires that raise giddy heads among the clouds depend upon the mechanic's art for their strength and symmetry. Not an edifice for devotion, or business, or comfort, but bears the impression of their hands. How exalted is their avocation! how sublime their calling!

IT is not only a pleasure to travelers, but frequently a matter of great importance, that the names of stations should be placed upon the station-house or depot on all important railway lines. Yet some of our leading passenger lines have neglected this important matter. Many of the roadside railway stations in England have their names sown in dwarf flowers on the banks outside, or worked in flint on the pavement.

A BAR of iron which is worth but $5, when manufactured into horse-shoes is worth $10; the same bar of iron made into nails is worth $55; the same made into knife-blades is worth $29,840; when made into watch springs, it is increased in value to the enormous sum of $250,000.

THE time is not far distant when the workshop of the world will be transferred to the United States, where not only fuel and iron ores exist in exhaustless quantities, but the greatest cotton fields are found, and nearly every great staple raw material abounds.

THE Baltimore and Ohio is building a number of new brick shops, a round-house, etc., at Newark, Ohio, the junction of the Central Ohio and the Lake Erie divisions.

Mechanical and Scientific.

VARNISH TO PROTECT POLISHED METALS FROM RUSTING.—Dr. C. Pusher recommends the use of a solution of paraffine (one part by weight in three parts of petroleum) as a varnish, which may be usefully applied to polished metals, especially as, after having brushed this liquid over the surface of the metals, they may be gently wiped clean with a soft piece of flannel, so as to leave only a very thin film of the varnish, yet sufficient for the protection of the polish.

TO MAKE SCREWS HOLD IN SOFT WOOD.—After having bored the hole in which the screw is to be inserted, put into it a piece of soft wood half the size of the screw, and previously dipped in melted glue. Then insert the screw as quickly as possible, and screw it home. If no melted glue is at hand, fill the hole with powdered resin, and make the screw hot enough to melt the resin before inserting it. Then screw it in as rapidly as you possibly can.

A CHEAP PACKING.—An engineer says that for packing for the stuffing-boxes of pumps, he uses common wood shavings from a carpenter's bench. Fill the box well with shavings and press them down either with a packing stick or by screwing down the valve once or twice. The water causes the shavings to swell; they are found to be effectual and durable.

TO DARKEN MAHOGANY.—Nothing more is necessary than to wash the mahogany with lime-water, which may readily be made by dropping a piece of lime into a basin of water.

TO CLEAN AND POLISH IVORY CARVINGS.—First, bath-brick in powder, well sifted with felt and spirit of wine, or with a circular brush; afterward, finely-washed whiting and spirits, and you will have a beautiful polish of turned work. Nothing is better to finish with than ivory-dust.

TO REMOVE INK-STAINS FROM FURNITURE.—Pour some lemon-juice on the ink-spot, and rub it well with the finger. Then wipe it off with a cloth, and if the stain has not entirely disappeared, apply more lemon-juice. Continue to do this until the stains are removed.

TO STAIN WOOD A FINE BLACK.—Drop a little oil of vitriol into a small quantity of water, rub the same on your wood, then hold it to the fire until it becomes a fine black, and when polished, it will become exceedingly beautiful.

Facetiæ.

A FEW nights ago, Smith got in a sleeping-car at Pittsburg, and slumbered peacefully for two or three hours. About midnight, he thought he would get out upon the platform for a few moments to breathe the fresh air, and to enjoy the delicious moonlight. He did so, and slammed the door after him. In a minute or two, he had breathed enough fresh air, and had gazed sufficiently long upon the moonlight. The door had a spring-lock, and would not open; and, although he thumped and pounded with vigor, the car-keeper did not hear him. So that denuded Smith, dressed in a night-shirt of ridiculous thinness, sat down on the steps while the train went dashing over the Alleghanies. Probably in the whole realm of nature a more disconsolate and melancholy Smith than that shuddering being upon the steps could not be found; and he was mad besides. When the train reached Downington, he was discovered. He retained his sitting posture when he was carried into the car, and even when he got home. And now he sits in a chair, with bandages on his head, tallow upon his nose, mustard-plasters upon his back, his feet in hot water, and with enough rheumatism in his bones to go around among the entire Smith family, and make each member utterly miserable. When interviewed upon the subject of sleeping-cars and moonlight, Mr. Smith now uses language which no respectable paper can print without endangering the public morals.

A PENNSYLVANIA editor, who was on a dead-head excursion out on the plains, lost his pass and had to walk seventy miles before he could find a man who had sufficient confidence in him to lend him money to telegraph home for his wife to sell the cook-stove, and remit the proceeds at once.

As one of the evening trains was coming into the Springfield depot the other night, a little girl who saw the flaring lights and general diabolical appearance of the place, nestled up to her mother's side, and inquired in an awe-struck whisper, "Mamma, is this hell?"

SMALL boy, on tiptoe, to his companions: "Sha! stop your noise, all of you." Companions: "Hello, Tommy, what's the matter?" Small boy: "We've got a new baby; it's very weak and tired; walked all the way from heaven, last night; mustn't be kicking up a row here now."

A LITTLE boy who loved to pass his evenings in the stores and listen to the improving conversation of the elders while helping himself to sugar, was told the other night that hereafter he must stay at home. "I wish I was a man," he said. "And what would you do if you were a man?" asked his mother. "I would get married, and then could go to the stores every evening."

WHEN her majesty Queen Victoria was taken to task by a right reverend years ago, for having Channing's works on her table, and her majesty asked, "Why not?" the ecclesiastic unsuspectingly replied that they contained very objectionable passages. "Ah!" retorted the gracious sovereign, "I perceive you are before me in having read them."

THEY have a man in Lock Haven whose name is Gaudam. His would be a nice name for a church deacon. For instance, the preacher would say, "Gaudam you pass the plate." It sounds like "cussin," don't it? If we were that fellow, we would have our Gaudam name immediately changed to something more reverential.

A LITTLE girl, daughter of a clergyman, being left one day to "tend door," and obeying a summons of the bell, she found a gentleman on the steps who wished to see her father. "Father isn't in," said she, "but if it's any thing about your soul I can attend to you. I know the whole plan of salvation."

MACHINERY has reached a great effectiveness and often performs wonders. We saw some burnt peas put into the hopper of a coffee mill the other day, and in less than two minutes it was occupying a place in a grocery window, labeled, 'Old Government Java."

A CONNECTICUT fisherman one day baited his hook with a live frog. After patiently waiting some time for a bite, as he chatted with a friend, he found that his lively bait had swam ashore, and was sitting quietly on the rock by his side. He wound up his line and went home.

THE rage for expensive funerals is strong even in death. "Are you prepared for the great change?' asked his minister of one of the venerable Smiths. "I am afraid not," said John sadly; "the means for the occasion are insufficient."

A PERKIN (Illinois) woman was asked by the preacher if her husband feared the Lord. She replied, "Fear him! Why, bless you, he is so feared of Him, that he never goes out of the house on Sundays without taking his gun along."

A NEW dish is grape-leaves fried in an egg batter. It is called a French dish, and is imported from Lake Mahopac. We can't think of any thing that would be more delicious than fried grape leaves, unless it is a circus poster on toast.

DOGS beat dentists. They insert natural teeth, but it is putting them in that hurts, rather than pulling them out.

Oct. 1872

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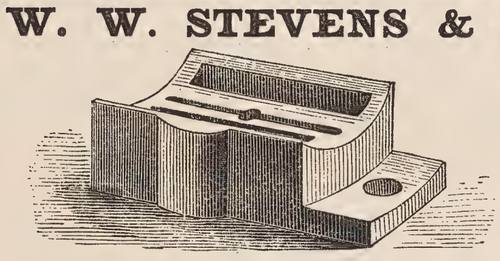

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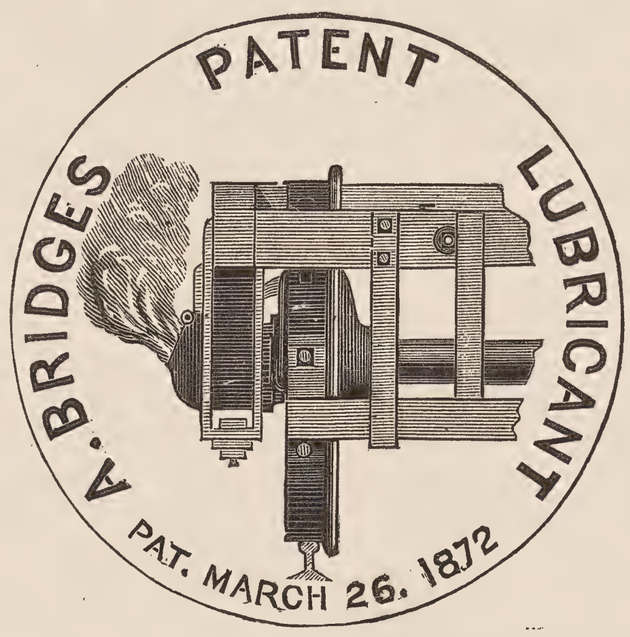

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In presenting this Lubricant to the notice of Railroad and Steamboat Managers and Operators in Machinery generally, I do so with a practical knowledge of its merits, and with confidence that it will be found to possess invaluable qualities as a

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It has been in use, during the past two years, on a number of Railroads and Steamers, and is highly approved of.

Parties wishing to make a practical test of the Lubricant will be furnished with sample on application.

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F. W. BLOODGOOD, Esq., *President Patent Elastic Felt Co. P. O. Box 129, Jersey City, N. J.:*

DEAR SIR: Press of business and absence from the city has prevented me from saying to you earlier, that our experiment the past year, in using your Patent Elastic Felt for Pillows and Mattresses, in the coaches of this Company, has proved entirely satisfactory, and that I now regard it as decidedly preferable to hair and feathers. It does not pack like hair, is soft, durable, and withal cheaper. Respectfully yours,

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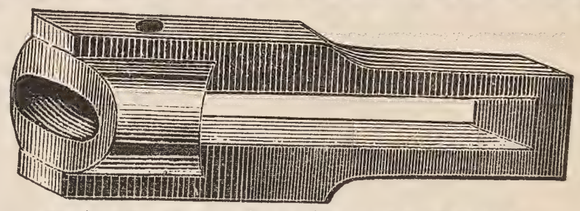

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These ornaments hold glue and screws as well as carvings. They do not warp or crack. They are unaffected by changes of temperature, and withstand dampness as well as furniture. They will polish in every respect equal to wood, either with shellac, oil, wax, or varnish, and with less trouble, as there is no open grain to fill. They will gild or bronze beautifully by simply sizing, without any other preparation.

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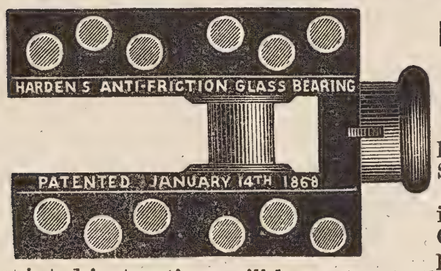

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Atlanta & West-Point	Wm. Rushton		Atlanta, Ga.
Atlanta & West-Point	R. D. Cole	R. D. Cole	Newnan, Ga.
Atlantic & Gulf	C. E. Van Vorst	P. N. Raynal	Savannah, Ga.
Atlantic & North-Carolina	E. J. Clayton	E. J. Clayton	New-Berne, N. C.
Atlantic & Great Western	‡John Van Vechten	§J. H. F. Wiers	Meadville, Pa.
Atlantic & Great Western	William Fuller	D. S. Dockstader	Meadville, Pa.
Atlantic & Great Western	N. Wright	W. G. Haggard	Cleveland, Ohio.
Atlantic & Great Western	J. B. Miller.	S. V. Smith	Kent, Ohio.
Atlantic & Great Western	Allen Cook	J. W. Holmes	Galion, Ohio.
Atlantic & Pacific	†John Hewitt	John Hewitt	St. Louis, Mo.
Atlantic, Mississippi & Ohio			
Norfolk & Petersburg Division	J. S. Whitworth	J. S. Whitworth	Norfolk, Va.
South-Side of Virginia "	T. J. Robinett	T. J. Robinett	Petersburg, Va.
Virginia & Tennessee "	F. Sterk	W. A. Morgan	Lynchburg, Va.
Virginia & Kentucky "			
Allegheny Valley	G. W. Glass	R. Gunning	Pittsburg, Pa.
Androscoggin	Ira K. Russell	C. S. Greenwood	Farmington, Maine.
Adirondack			Saratoga, N. Y.
B			
Baltimore & Ohio	†John C. Davis	J. S. Shryack.	Baltimore, Md.
Baltimore & Ohio		James H. Miller	Baltimore, Md.
Baltimore & Ohio	Wm. Edwards		Martinsburg, Va.
Baltimore & Ohio	A. J. Cromwell		Piedmont, Va.
Baltimore & Ohio	E. W. Lippencott		Grafton, W. Va.
Baltimore & Ohio			Wheeling, W. Va.
Central Ohio Division	Alex. Platt		Zanesville, Ohio.
S'dusky, Mans., & New'k Div.	Wm. Y. Johnson	Charles Scoeby	Sandusky, Ohio.
Bangor, Old Town & Milford	J. B. Peckham	John H. Brown	Bangor, Maine.
Bellefonte & Snow Shoe	H. D. Landis	H. D. Landis	Bellefonte, Pa.
Belvidere Delaware	R. McDowell	John Silvers	Lambertville, N. J.
Boston & Albany	Wilson Eddy	F. D. Adams	Springfield, Mass.
Boston & Albany	A. B. Underhill	W. E. Chamberlain	Allston, Mass.
Boston & Providence	George Richards	John Lightner	Roxbury, Mass.
Boston, Clinton & Fitchburg	John Webster	Samuel Stevens	Fitchburg, Mass.
Boston, Concord & Montreal	R. Adams	M. R. Elkins	Lake Village, N. H.
Boston & Maine	F. A. Waitt		Boston, Mass.
Boston & Maine		D. C. Richardson	Lawrence, Mass.
Boston, Lowell & Nashua	L. R. Winslow		Boston, Mass.
Boston, Lowell & Nashua		S. A. Davis	Nashua, N. H.
Blossburg & Corning	O. C. Patchell	O. C. Patchell	Corning, N. Y.
Brockville & Ottawa	Joseph Cockfield	Joseph Cockfield	Brockville, Can.
Blue Ridge			Anderson, S. C.
Burlington & Missouri River	G. Chalender	G. Chalender	Burlington, Iowa.
Burlington & Missouri River	J. Christiansen		Plattsmouth, Neb.
Burlington, Cedar Rapids & Minn	J. P. Messer		Cedar Rapids, Iowa.
Buffalo & Washington			Buffalo, N. Y.
Boston, Hartford & Erie	Geo. E. Boyden	Elias E. Pratt	Boston, Mass.
Buffalo, Corry & Pittsburg	Thomas Connell	Thomas Connell	Corry, Pa.
Buff. Bayou, Brazos, Colorado		M. Borst	Harrisburg, Tex.
C			
California & Pacific	O. R. Ford	D. Rutherford	Vallejo, Cal.
Camden & Amboy	F. B. Stevens		Hoboken.
	T. T. Kerr	E. Lockwood	Bordentown, N. J.
	Thomas Single		South-Amboy.
Camden & Atlantic	E. Collings	S. Wills	Camden, N. J.
Catawissa	A. J. Prescott	G. P. Fenstermacher	Catawissa, Pa.
Cape Cod	E. A. Walker	William Cannon	Hyannis, Mass.
Catasauqua & Fogelsville	Thomas Evans	Chas. J. Holbach	Catasauqua, Pa.
Carrolton & Oneida	M. T. Wiggins		Carrolton, Ohio.
Charleston & Savannah	H. T. Calder		Charleston, S. C.
Chesapeake & Ohio	W. G. Freeman	J. N. King	Richmond, Va.
Chesapeake & Ohio	T. J. Hamer		Huntingdon, W. Va.
Cheraw & Darlington	D. W. Haines		Florence, S. C.
Champlain Trans. Co.	H. T. Calder		Burlington, Vt.
Cheshire & Ashuelot	F. A. Perry	F. A. Perry	Keene, N. H.
Charlotte, Columbia & Augusta	Robert King	J. Q. Seats	Columbia, S. C.
Chicago & North-western		Thomas Hull	Chicago, Ill.
Wiscon. Mad. & Mill. Divis		Henry Hull	Fond du Lac, Wis.
Galena Division	R. W. Bushnell	Hugh Gray	Chicago, Ill.
Wiscon. Mad. & Mill. Divis	T. B. Tilton		Chicago, Ill.
Iowa Division	C. C. Elliott	William Campbell	Clinton, Iowa.
Peninsula Division	S. L Pierce		Escanaba.
Chicago & Alton	John A. Jackman	R. Reniff	Bloomington, Ill.
Chicago, Burlington & Quincy			
Eastern & Middle Division	E. T. Prindle	W. W. Wilcox	Aurora, Ill.
Galesburg Division	Wm. Wilson		Galesburg, Ill.
Quincy Division	Joel West		Quincy, Ill.
Burlington Division	S. E. Burtch		Burlington, Ill.
Buda Division	P. R. Sutton		Buda, Ill.
Chicago, Cincinnati & Louisville	C. F. Kidder	D. B. Howe	La Porte, Ind.
Chicago, Clinton & Dubuque	L. W. Worster		Dubuque, Iowa.
Chicago, Dubuque & Minnesota	L. W. Worster		Dubuque, Iowa.
Chicago, Rock Island & Pacific	T. B. Twombly	B. K. Verbryck	Chicago, Ill.
Chicago, & Michigan Lake Shore	Wm. L. Fitch	Oliver Udell	St. Joseph, Mich.
Chicago, Danville & Vincennes	J. A. Wood	W. H. Dunham,	Momencee, Ill.
Cleveland, Col., Cin., & Indianapolis	L. S. Young	William F. Smith	Cleveland, Ohio.
Cleveland and Pittsburg	N. E. Chapman	A. Steinbrunner	Cleveland, Ohio.
Cleveland, Mt. Vernon & Delaware	J. W. Holloway	J. W. Holloway	Akron, Ohio.
Cincinnati, Hamilton & Dayton	William Cullen	W. H. H. Allison	Cincinnati, Ohio.
Cincinnati & Muskingum Valley	Leroy Kells	Daniel Jewell	Lancaster, Ohio.
Cincinnati & Indianapolis Junction	W. McKinzie	Edwin Beeny	Indianapolis, Ind.
Cincinnati, Sandusky & Cleveland	John Y. Beatty.	William Earick	Sandusky, Ohio.
Columbus, Chicago & Indiana Central	(See Pitts. Cinn. & St. Louis)		
Concord	Chs. L. Eastman	M. W. Dickerman	Concord, N. H.
Concord & Claremont	J. N. Lander	A. Langmaid	Concord, N. H.
Connecticut River	John Mulligan	R. Hitchcock	Springfield, Mass.
Contoocook River			Concord, N. H.
Conn. & Passumpsic Rivers	Horace Alden	Horace Alden	Lyndon, Vt.
Cumberland Valley	A. S. Hull	C. W. Nitterhouse	Chambersburg, Pa.
Cumberland & Pennsylvania	W. L. Jordan	J W. Sauerbach	Mt. Savage, Md.
Central of Georgia		C. C. Millar	Savannah, Ga.
Central of New-Jersey	*T. W. Peeples	George Hackett	Elizabethport, N. J.
Central Branch Union Pacific	Wm. D. Rowley		Atchison, Kansas.
Central R. R. of Iowa	O. R. Ford	O. R. Ford	Marshall, Iowa
Central Pacific	A. J. Stevens	Benjamin Welch	Sacramento, Cal.
D			
Dayton & Union	A. J. Keenan	J. F. Feicht	Dayton, Ohio.
Danbury & Norwalk	Charles A. Craig		Danbury, Ct.
Dayton & Michigan	William Cullen	W. H. Allison	Cincinnatti, Ohio.
Delaware, Lackawanna & Western	Walter Dawson	Robert McKenna	Scranton Pa.
Des Moines Valley	James Lamb	R. E. Smith	Keokuk, Iowa.
Detroit & Milwaukee	B. Briscoe	B. Briscoe	Detroit, Mich.
Delaware & Hudson Canal Co	James Dickson	Thomas Orchard	Carbondale, Pa.
Rensselaer & Saratoga Div	W. B. Gage		Troy, N. Y.
Dorchester & Delaware			Cambridge, Md.
Dubuque South western	I. M. Smith	I. M. Smith	Farley, Iowa.
Dutchess & Columbia	W. G. Vanbuskirk	H. A. Webster	Fishkill, N. Y.
Dunkirk, Warren & Pittsburg	J. C. Haggett	J. C. Haggett	Dunkirk, N. Y.
E			
Eastern		J. P. Somerby	Salem, Mass.
Eastern	John Thompson		East-Boston, Mass.
East-Tennessee & Virginia	Eli Hixon	Jos. Armbruster	Knoxville, Tenn
East-Tennessee & Georgia	Eli Hixon		Knoxville, Tenn.
East Pennsylvania	J. M. Geary	Samuel Reeves	Reading, Pa
Elizabethtown and Paducah		T. A. Cordrey	Elizabethtown, Ky.
Erie Railway	*E. O. Hill		Susquehanna, N. Y.
Erie Railway	James B. Gregg		
Erie Railway	H. L. Brown	C. A. Smith	Jersey City, N. J.
Erie Railway	M. E. Brown	M. Wilder	Buffalo, N. Y.
Erie Railway	W. E. Cooper	W. E. Cooper	Hornellsville, N. Y.
Erie Railway		W. E. Rutter	Elmira, N. Y
Evansville & Crawfordsville	John L. White	Joseph Stiker	Evansville, Ind.
Evansville, Henderson & Nashville	Jos. Crawford	W. H. H. Price	Henderson, Ky
European & North Am. (of Maine)	A. O. Bailey	J. H. Brown	Oldtown, Maine.
Erie & Pittsburg	John Young	John Young	Erie, Pa.
Evansville, Terre Haute, & Chicago			Terre Haute, Ind.
F			
Flushing & North Side			
Florida	A. W. Taylor	G. Hernandez	Fernandina, Fla.
Flint & Pere Marquette	Sanford Keeler	Sanford Keeler	East-Saginaw, Mich.
Fitchburg	Geo. A. Cooledge	Enos Varney	Charlestown, Mass.
Fitchburg & Worcester	John Webster	Samuel Stevens	Fitchburg, Mass.
G			
Grand Trunk	†Richard Eaton	J. W. W. McWood	Montreal, Canada.
Grand Trunk		Howard Fry	Sherbrooke, Can.
Grand Trunk		B. J. Mitchell	Portland, Me.
Galveston, Houston & Henderson	Wm. Macbeth	Wm. Macbeth	Galveston, Texas.
Grand Rapids & Indiana			Fort Wayne, Ind.
Great Western of Canada	†Wm. A. Robinson	F. Childs	Hamilton, Canada.
Georgia	William Hardman	T. M. Preval	Augusta, Ga.
Greenville & Columbia	J. T. Price	J. T. Price	Helena, S. C.
H			
Harlem Extension	George W. Blanchard		Rutland, Vt.
Harlem Extension		C. S. Clapp	Bennington, Vt.
Hanover Branch	John J. Bingley	Henry Britcher	Hanover, Pa.
Hartford & New-Haven	John O. Chapman	F. Leppense	Hartford, Ct.
Hannibal & St. Joseph	H. A. Towne	H. C. Whiting	Hannibal, Mo.
Hartford, Providence & Fishkill	Edwin Garfield	V. D. Perry	Hartford, Ct
Hackensack & New-York	Abra'm Angausen		Hackensack, N. J.
Housatonic	C. R. Morris	J. Ferris	Bridgeport, Ct.
Houston & Texas Central	George Stevens	F. S. Tull	Houston, Texas.
Houghton & Ontonagon			L'Anse, Mich.
Houston Tap & Brazoria	T. J. Shellhorn	T. J. Shellhorn	Houston, Texas.
Huntington & Broad-Top Mountain	D. G Gilchrist	M. Tellerhoof	Saxton, Pa.
Hempfield	T. Marsh		Wheeling, Va.
Houston & Great Northern	T. J. Shellhorn	T. J. Shellhorn	Houston, Texas.
I			
Indianapolis, Cincinnati & Lafayette	S. Griffith	S. Griffith	Cincinnati, Ohio.
Indianapolis, Peru & Chicago	John McKenna	John McKenna	Peru, Ind.
Illinois Central	†S. J. Hayes	H. O. Wadlie	Chicago, Ill.
Chicago Division	George Holton		Chicago, Ill.
South Division	David Oxley		Centralia, Ill.
North Division	J. B. Edams		Amboy, Ill.
Iowa Division	Thomas W. Place		Waterloo, Iowa.
Iowa & Missouri State Line			Farmington, Iowa.
Iron	Perry Scott	Clem. Roetling	Ironton, Ohio.
Indianapolis & St. Louis	Wm. Barkla	R. B. More	Mattoon, Ill.
Indianapolis, Bloomington & Western	Tho. V. Losee	Tho. V. Losee	Urbana, Ill.
Ionia & Lansing	H. Loughlin		Lansing, Mich.
Indianapolis & Vincennes	A. E. Allcott		Indianapolis, Ia.
J			
Jeffersonville, Madison & Indiana	Reuben Wells	John Higgins	Jeffersonville, Ind.
K			
Knox & Lincoln			Bath, Maine.
Kentucky Central	J. R. Ledyard	J. L. Hackathorn	Covington, Ky.
Knoxville & Charleston			Knoxville, Tenn.
Kansas Pacific	L. H. Waugh		Wyandotte, Kansas.
Kalamazoo, Allegan & Grand Rapids			Kalamazoo, Mich.
Kansas City, St. Joseph & Council Bluff	H. L. Cooper	H. L. Cooper	St. Joseph, Mo.
L			
Lake Erie & Louisville	John Pero		Fremont, Ohio.
Lake Superior & Mississippi	W. McFarland	A. Coburn	St. Paul, Minn.
Lackawanna & Bloomsburg	Chas. Graham		Kingston, Pa.
Lehigh Valley	J. Kinsey.		South-Easton, Pa.
Lehigh Valley	P. Hofecker	E. R. Brown	Weatherly, Pa.
Lehigh Valley	A. Mitchell	Mauch Chunk, Pa.	Delano, Pa.
Lehigh Valley	D. Clark		Hazelton, Pa.
Lehigh & Susquehanna	L. C. Brastow	L. C. Brastow	Wilkesbarre, Pa.
Lehigh & Susquehanna	Wm. H. Brown		Mauch Chunk, Pa.
Leavenworth, Lawrence & Gal	S. M. Philbrick		Lawrence, Kansas.
Little Rock & Fort Smith	A. Klohs		Little Rock, Ark.
Little Miami	J. H. Setchel		Cincinnati, Ohio.
London & Port Stanley			London, C. W.
Louisville, New-Albany & Chicago	Jacob Losey	Jacob Losey	New-Albany, Ind.
Long Island	Chs. A. Thompson		Hunter's Point, L. I.
Louisville, Cincinnati & Lexington	John Skidmore	S. S. Pilson	Louisville, Ky.
Louisville & Nashville	Thatcher Perkins	Thatcher Perkins	Louisville, Ky.
Clarksville Division	Jas. Montgomery		Bowling Green, Ky.
Lake Shore & Michigan Southern	*James Sedgley	‡John Kirby	Cleveland, Ohio.
Michigan Southern Division	William Hill		Elkhart, Ind.
" " "		S. S. Knapp.	Adrian, Mich.
Toledo Division	Geo. H. Tier	Frank O. Bray	Norwalk, Ohio.
Erie Division	L. O. Gassett	J. Withyecombe	Cleveland Ohio.
Buffalo Division	B. H. Kidder	A. Robson	Buffalo, N. Y.
M			
Marquette & Ontonagon	A. P. Burroughs	H. D. Lyons	Marquette, Mich.
Macon & Augusta			Macon, Ga.
Maine Central	J. W. Philbrick	J. W. Philbrick	Waterville, Me.
Macon & Western	D. M. Gogul	James A. Knight	Macon, Ga
Manchester & Lawrence	Chas. L. Eastman	M. W. Dickerman	Concord, N. H.
Macon & Brunswick	M. Thornton	M. Thornton	Macon, Ga.
Maysville & Lexington			Maysville, Ky.
Marietta & Cincinnati	E. Bosley	E. Bosley	Chillicothe, Ohio
Memphis & Little Rock	N. Greener	C. W. Wooldridge	Huntsville, Ark.
Memphis & Charleston	Michael Burk	A. W. Drew	Memphis, Tenn.
Memphis & Charleston	H. N. Burford	Fabien Varin	Huntsville, Ala.
Mineral Point	Robert Hay		Mineral Point, Wis.
Mississippi & Tennessee	James Eblen	James Eblen	Memphis, Tenn.
Mississippi Central	Henry Gibbon	John E. Becton	Water Valley, Miss
Maryland & Delaware	Samuel Peters		Greensboro, Md.

* Mechanical Engineer.
‡ General Master-Mechanic.
† Master of Machinery.
§ Gen. Master Car-Builder.
General Foreman.

* General Master-Mechanic.
† Mechanical Superintendent.
‡ General Master Car-Builder.

Railroad.	*Master-Mechanic.*	*Master Car-Builder.*	*Residence.*
Mississippi, Gains. & Tus			Gainsville, Ala.
Midland Pacific			Nebraska City, Neb.
Milwaukee & St. Paul	T. S. Davis	Wm. E. Kettridge	Milwaukee, Wis.
Milwaukee & St. Paul		John Baillie	Milwaukee, Wis
Milwaukee & St. Paul	J. Pattee	D. F. Wilson	Minneapolis, Minn.
Hastings & Dakota Division	C. C. Clements		Hastings, Minn.
Michigan Central	A. S. Sweet, Jr.	J. B. Sutherland	Detroit, Mich.
Grand River Valley Division		James Potts	Jackson, Mich.
J'kson, Lans'g & Saginaw Div.	Andrew Wilson	Andrew Wilson	Jackson Mich.
Montgomery & West-Point	J. McVey	W. H Daniels	Montgomery, Ala.
Montgomery & Eufaula	James McCann	I. E. Holmes	Montgomery, Ala.
Mobile & Montgomery	James McFarland	L. Barham	Montgomery, Ala.
Mobile & Girard	William Eyles	A. J. Nix	Girard, Ala.
Mobile & Ohio	L. J. Fleming	John McHugh	Mobile, Ala.
	B. S. Skates	B. S. Skates	Whistler, Ala.
Missouri River, Fort Scott & Gulf	John S. McCrum		Kansas City, Mo.
Missouri River, Fort Scott & Gulf		Josiah Stahl	Wyandotte, Kan.
Missouri, Kansas & Texas	C. T. McIlvaney	J. Townsend	Sedalia, Mo.

N

Nashville & Chattanooga	John U. Eastman	J. G. Sawyer	Nashville, Tenn.
Nashville & Decatur	C. B. Knowles	C. B. Knowles	Nashville, Tenn.
New-Bedford & Taunton	Robert Chase	Robert Chase	New-Bedford, Mass.
New-Canaan			New-Canaan, Ct.
New Brunswick & Canada	T. Armstrong	T. Armstrong	S'nt Andrew's N.B
New-Haven & Northampton	Henry Fox	Henry Fox	New-Haven, Ct.
New-York & Harlem	Wm. M. Strong	Leander Garey	New-York.
New-YorkCentral & Hudson River	G. B. Van Vorst		Albany, N. Y.
New-York Central & Hudson River	Henry Watkeys		Syracuse, N. Y.
New-York Central & Hudson River	Amos Gould		Rochester, N. Y.
New-York Central & Hudson River		Wm. Johnson	Buffalo, N. Y.
New-York Central & Hudson River	Wm. Buchanan	John McKenna	New-York.
New-York Central & Hudson River	John Dikeman		East-Albany, N. Y.
New-York Central & Hudson River		Joseph Jones	West-Albany, N. Y.
New-York Central & Hudson River		George Rowe	Niagara Falls, N.Y.
New-York, Boston & Montreal	S. W. Tozer	S. W. Tozer	E. Tarrytown, N.Y.
New-York & Oswego Midland	Wm. H. Griggs	Wm. H. Griggs	Oswego, N. Y.
New-York, Providence & Boston	Jas. H. Anderson	Jas. H. Anderson	Providence, R. I.
New-York & New-Haven	H. Kittendorf	M. C. Andrews	New-Haven, Ct.
New-London Northern	J. W. Dow	S. W. Caulkins	New-London, Ct.
New-Jersey Midland	J. E. Wiggins	J. E. Wiggins	Godwinsville, N. J.
New-Jersey Southern	Rufus Blodgett		Manchester, N. J.
New-Haven & Derby			New-Haven, Ct.
New-Orleans, Opelousas & Gt. Western	John McCluskey	Matthew Nolan	Algiers, La.
New-Lisbon			Leetonia, Ohio.
New-Orleans & Ohio	John R. Jordan	John R. Jordan	Paducah, Ky.
New-Orleans, Jackson & Gt. Northern	John Conlon	Charles Bartine	New-Orleans, La.
New-Haven, Hartford & Springfield			Hartford, Ct.
Naugatuck		George W. Gray	Bridgeport, Ct.
Newark & Bloomfield	Luke F. Tronson		Hoboken, N. J.
Nova Scotia	W. Johnson		Bedford, N. S.
North-Carolina	Rufus D. Wade	B. G. Sergeant	Co. Shops, N. C.
New-Orleans, Mobile & Texas	Josiah Bettis	W. H. Johnson	Mobile, Ala.
Northern Central	C. M. Lewis		Baltimore, Md.
Northern Central		G. W. Demarest	York, Pa.
North-Lebanon		Henry B. Oves	Lebanon, Pa.
North-Pennsylvania	Franklin Roop	Franklin Roop	Philadelphia, Pa.
North-Eastern	D. W. Haines	A. M. Corrie	Florence, S. C.
Northern	James W. Lander	Albert Langmaid	Concord, N. H.
Northern of New-Jersey	T. W. Demorest		New-York.
Norwich & Worcester	Richard Colburn	G. R. Bentley	Norwich, Ct.
Northern of Canada	P. Clark	P. Clark	Toronto, Can.
Northern Pacific	†Geo. W. Cushing		St. Paul, Minn.

O

Ogdensburg & Lake Champlain	William A. Short	J. R. Ames	Malone, N. Y.
Old Colony & Newport	J. K. Taylor	A. Gleason	Boston, Mass.
Orange, Alexandria & Manassas	James E. Waddey	John T. Nalls	Alexandria, Va.
Oil City & Pithole	George Thompson		Pithole, Pa.
Oil Creek & Alleghany River	J. S. McElroy	Jacob Williams	Corry, Pa.
Oil Creek & Alleghany	H.J.Bookhammer	John Monks	Oil City, Pa.
Ohio & Mississippi		M. Contant	Cochran, Ind.
East Division	A. Thompson		Cochran, Ind.
West Division	H. Elliott	E. Martin	East St. Louis, Ill.

P

Panama	Chas. E. Stewart	J. G. Wilson	Aspinwall, N. G.
Pacific of Missouri	†John Hewitt	John Hewitt	St Louis, Mo.
Pennsylvania	†G. C. Gardner		Altoona, Pa.
Pennsylvania	H. D. Garrett	I. W. Van Houten	W. Philadelphia, Pa.
Pennsylvania	E. L. Caum	Samuel W. Myers	Harrisburg, Pa.
Pennsylvania	G. W. Strattan	John P. Levan	Altoona, Pa.
Pennsylvania	D. O. Shaver	R. S. Ramsey	Pittsburg, Pa.
New-Jersey Division	John Headden	David H. Baker	Jersey City, N.
Philadelphia & Erie	Martin Walls	George J. Mason	Sunbury. Pa.
	W. L. Foster	Robt. M. Messimer	Renovo, Pa.
	W. L. Holman	Wm. P. Newcomb	Kane, Pa.
	W. T. Smith	David Cowley	Erie, Pa.
Philadelphia, Wilmington & Baltimore	George W. Perry	George W. Perry	Wilmington, Del.
Philadelphia & Reading	L. B. Paxson	Aaron Steinbach	Reading, Pa.
Philadelphia, Germ'n & Norris'n	John Moyer	Nathan Pawling	Philadelphia, Pa.
Philadelphia & Baltimore Central	S. D. Danfield	SamuelD. Danfield	Chester, Pa.
Pittsburgh, Cincinnati & St. Louis			
Pittsburgh & Columbus Division	E. Pierce		Dennison, Ohio.
Pittsburgh & Columbus Division		James McGee	Steubenville. Ohio.
Little Miami Division		M. P. Ford	Columbus, Ohio.
Little Miami Division	J. H. Setchel		Pendleton, Ohio.
Col., Cin. & Ind. Division	Robert Curtis	Tho. Chamberlain	Columbus, Ohio.
Col., Cin. & Ind. Division	W. H. Purdy	W. H. Purdy	Logansport, Ind.
Peoria & Rock Island	Theo. Mosher		Peoria, Ill.
Pittsburg, Fort Wayne & Chicago	S. M. Cummings	John Marquis	Alleghany, Pa.
Pittsburg, Fort Wayne & Chicago	J. M. Boon		Fort Wayne, Ind.
Pittsburg, Fort Wayne & Chicago		J. J. Kirkland	Crestline, Ohio.

* Mechanical Superintendent. † Superintendent of Motive Power and Machinery

Railroad.	*Master-Mechanic.*	*Master Car-Builder.*	*Residence.*
Pittsburg Washington & Baltimore	W. H. Harrison	J. M. Rutter	Connellsville, Pa.
Peoria, Pekin & Jacksonville	R. F. Hurd	R. F. Hurd	Pekin, Ill.
Peninsular	T. G. Templeton		Battle Creek, Mich.
Portland & Rochester	John G. Brady	John G. Brady	Portland. Me.
Portland & Kennebec	John Ellis	J. W. Trussel	Augusta, Me.
Portland & Oxford Central	Geo. W. Battles	Geo. W. Battles	Buckfield, Me.
Portland, Saco & Portsmouth	John Donnell		Portland, Me.
Port Royal			Beaufort, S C.
Port Hope, Lindsay & Beaverton	H. G. Taylor	H. G. Taylor	Port Hope, Can.
Port Huron & Lake Michigan	R. C. Stewart	R. C. Stewart	Port Huron, Mich.
Providence, Warren & Bristol	Rufus Smith	J. Brightman	Bristol, R. I.
Portsmouth, Gt. Falls & Monmouth	James Tucker	E. Fall	Union Village, N.H.
Petersburg & Weldon	R. B. Andrews	Alex. Wright	Petersburg, Va.
Providence & Worcester	Joseph Kelly	Olney L. Smith	Providence, R I.
Poughkeepsie & Eastern	John L. Driscoll	John L. Driseoll	Poughkeepsie, N. Y.

R

Raleigh & Gaston	J. B. Gayle	J. B. Gayle	Raleigh, N. C.
Richmond, Fredericksburg & Potomac	H. Kuhn	W. H. Trainham	Richmond, Va.
Richmond Danville & Piedmont	John McFarland	H, Longest	Richmond, Va.
Richmond & Petersburg	John O'Brien	J. J. Martin	Richmond. Va.
Richmond & York River	C. H. Harris	J. L. Thompson	Richmond, Va.
Rome, Watertown & Ogdensburg	Wm. Jackson	H. H. Sessions	Rome, N. Y.
Reading & Columbia	B. Van Lew		Columbia, Pa.
Rome, Georgia	O. W. Harbin	O. W. Harbin	Rome, Ga.
Rochester & Genesee Valley	M. E. Brown	M. Wilder	Buffalo, N. Y.
Rockford, Rock Island & St. Louis	J. F. Nolte		Beardstown. Ill.
Rutland	N. L. Davis	N. B. Allen	Rutland, Vt.

S

San Francisco & San José	R. B. Bishop	Frank Bellisle	San Francisco, Cal.
St. Croix & Lake Superior			New-York City.
St. Croix & Penobscot	Edward Bolton	A G. Page	Milltown, Me.
St. Lawrence & Ottawa	Calvin Dame	Calvin Dame	Prescott, Canada.
St. Louis & Iron Mountain	O. A. Haines	Oscar Doolittle	Carondelet, Mo.
St. Joseph & Denver City	E. Sleppy		Elwood, Kan.
San Antonio & Mexican Gulf	W. T. Bingham		Victoria, Texas.
South Side of Long Island	A. P. Doane	M. Heitzman	Williamsburg, L. I.
St. Paul & Sioux City	Jas. G. Butterfield		Shakopee, Minn.
St. Louis, Vandalia, T. Haute & Ind.	C. R. Peddle	H. Kirmse	Terre Haute, Ind.
South-Carolina	W. B. Smith	John Reed	Charleston, S. C.
South & North-Alabama	Tho. Jeffries	Tho. Jeffries	Lime Station, Ala.
Southern Central	Chas. G. Brown	H. Mooney	Auburn, N. Y.
Southern Minnesota	Wm. Lininger		Wells, Minn.
Southern of Canada	Albert Congdon	Albert Congdon	Fort Erie.
South-Western of Georgia	C. D. Wall		Columbus, Ga.
South-Western of Georgia	D. M.Gogul	James A. Knight	Macon, Ga.
South Shore	Warren E. Ray		Cohasset, Mass.
Stanstead, Shefford & Chambly	W. H. Smith	M. Sessions	Waterloo, C. E.
Schuylkill & Susquehanna	John E. Wootten	John E. Wootten	Reading, Pa.
Seaboard & Roanoke	J. B. Pendleton	J. B. Pendleton	Portsmouth, Va.
Stonington & Providence	J. H. Anderson	J. H. Anderson	Providence, R. I.
Selma & Gulf	Wm. T. Daughtrey		Selma, Ala.
Selma, Rome & Dalton	A. G. Maynes	W W. Peirce	Selma, Ala.
Sioux City & Pacific	Charles Foster	J. R. Dow	Missouri Val., Iowa.
Spartanburg & Union	J. N. Benner	Jacob Rice	Union C. H., S. C.
Sheboygan & Fond du Lac	— Patterson	J. H. Erwin	Sheboygan. Wis.
Sullivan & Erie			Tonawanda, Pa.
Syracuse & Binghamton, N. Y.	B. G. Merrill	B. G. Merrill	Syracuse, N. Y
Sycamore & Cortland			Sycamore, Ill.
St. Louis & South-Eastern	L. B. Salisbury		Mt. Vernon, Ill.
St. Louis, Kansas City & Northern	John E. Calhoun	C. S. Buck	St. Louis, Mo.

T

Taunton Branch			Taunton, Mass.
Tioga	Peres Bonny	D. H. Stratton	Blossburg, Pa
Texas & New-Orleans	R. B. Baer		Houston. Texas.
Tennessee & Pacific	William McKeand.	William McKeand.	Nashville, Tenn.
Toledo, Wabash & Western	W. F. Ray		Fort Wayne. Ind.
Toledo, Wabash & Western		David Hoit	Toledo. Ohio.
	T. G. Gorman		Springfield, Ill.
Toledo, Peoria & Warsaw	A. H. De Clerq	R. M. Hemphill	Peoria, Ill.
Troy & Boston	Foster Church	R. V. Coon	Troy, N. Y.
Toronto, Grey & Bruce			Toronto, Can.

U

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Utica & Black River	Wm. E. Granger	David James	Utica, N. Y.
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V

Vicksburg & Meridian	Jas. B. Brown		Vicksburg, Miss.
Vineland			Vineland, N. J.
Vermont Central	J. M. Foss	Milton Sessions	St. Albans, Vt.
Vermont & Massachusetts	D. T. Davis	Jacob Marsh	Fitchburg, Mass

W

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Wilmington & Western	S. A. Hodgman		Wilmington, Del.
West-Jersey	W. McAllister	C. C. Williams	Camden, N. J.
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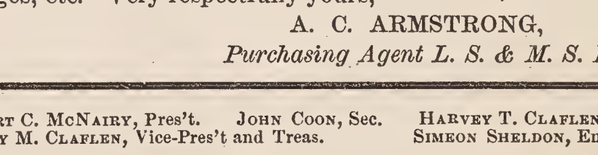

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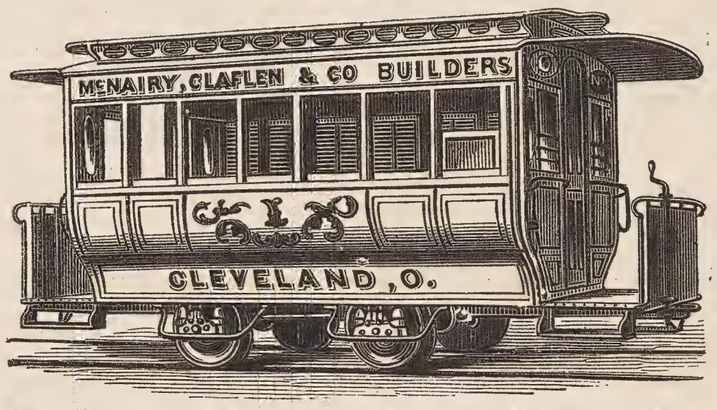

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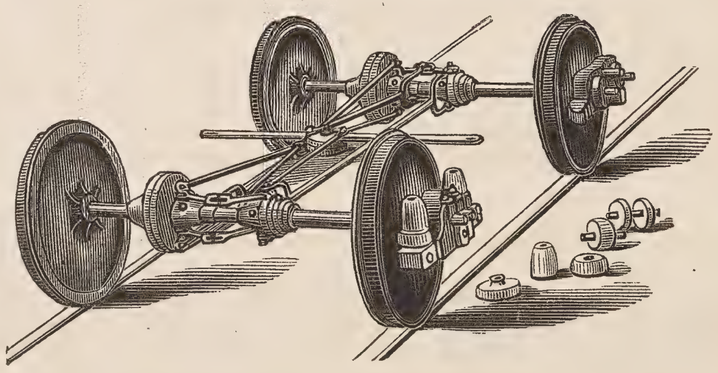

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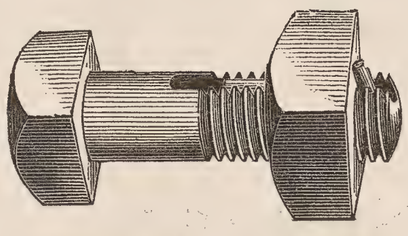
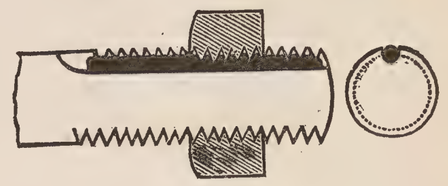


"CUMMING NUT-LOCK,"

Patented

June 16, 1868,

August 23, 1870.



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Unequaled for CHEAPNESS, SIMPLICITY & EFFECTIVENESS.

This simple device, as will be seen by the engravings, consists of a groove being cut in the threaded part of a screw bolt into which is placed a key of copper wire, or other soft metal; when the nut is screwed on, it cuts a thread on the key, thereby making it impossible for the key to get out until the nut is taken off. When the nut is screwed up to its place, that part of the key over which the nut has passed is riveted up against the nut with a small punch, destroying the thread on the key. The nut, therefore, can not move backward until force is used, as with a wrench.

The groove can be rapidly cut with a simple machine designed for the purpose.

Experience has proved this device absolutely reliable, and it is the cheapest of all known devices for the purpose. By its use, old bolts on which the nuts have become too slack for use can be made as good as new, making it a great saving to railroad companies and others in that item alone. It is cheaper than a check-nut.

If the bolt should become slack from shrinking of timber or other causes, *the nut will always remain firmly attached to the bolt*, and, with the wrench, can be screwed up *any distance*, and the wire riveted up any number of times, or can be taken off without injury to the nut or bolt.

This is the only method in use that locks the nut firmly to the bolt without regard to place or surroundings, all others require some attachment that holds the bolt in its position, and a washer or other attachment to keep the nut from turning.

DIRECTIONS FOR USE.—Place the copper key in the slot, pointed end out, and beveled side up, in such a position that when the nut is screwed to its place about three-eighths of an inch of the key will project beyond its outer face. Then screw the nut to its place *over the key*, allowing it to cut its own thread in the copper. Then take a narrow flat set punch, and rivet the projecting part of the key *solidly* against the outer face of the nut. To tighten the nut: screw it up, and rivet the key tighter. To remove the nut: simply apply the wrench and unscrew the nut. It will cut its own way out through the copper. The same key can be used several times, by moving it outward a few threads in the slot.

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A. REICH,

Manufacturer of

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The purest Metallic Paint in Market.

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Railway Body Varnish,

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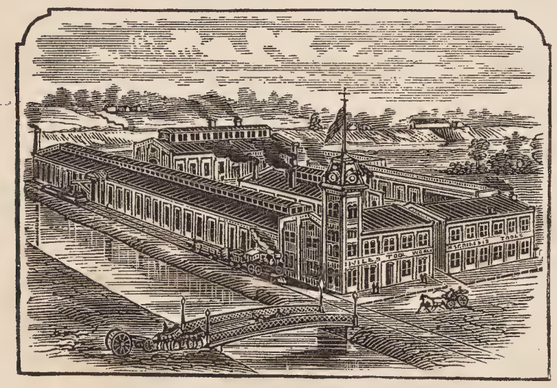

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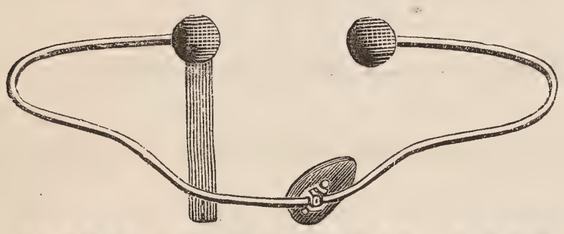

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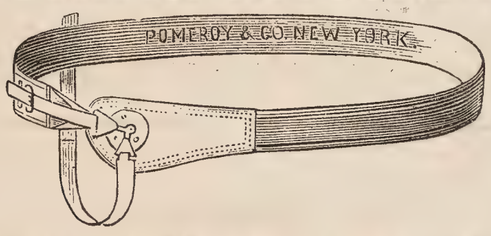

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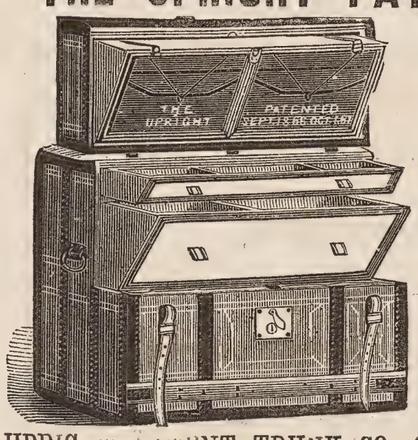

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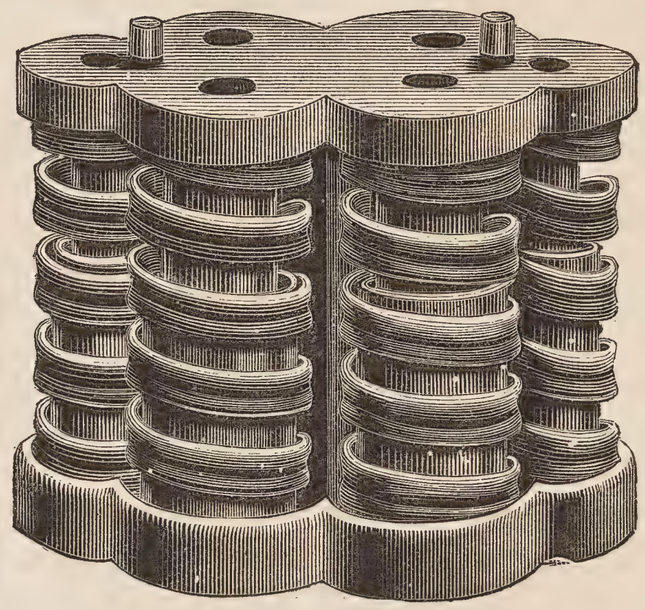

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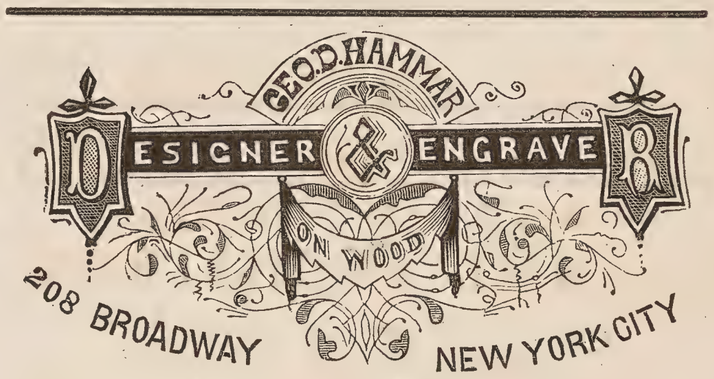

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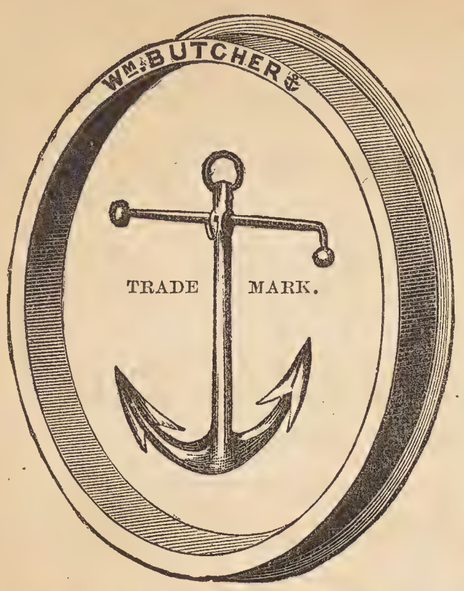

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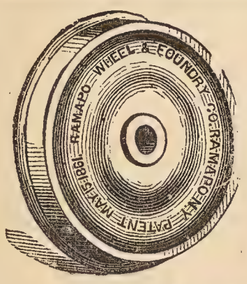

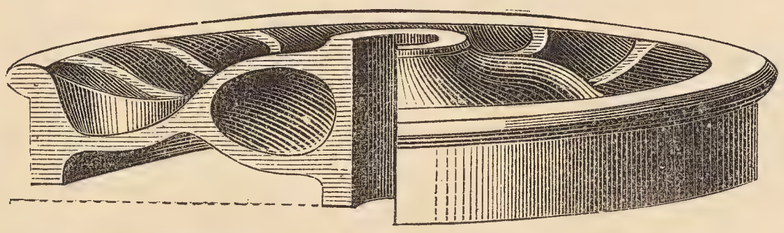

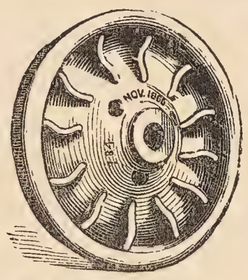

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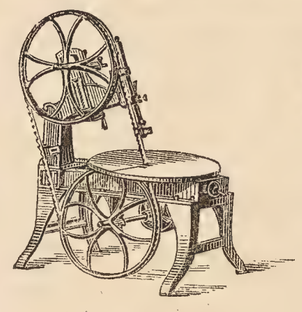

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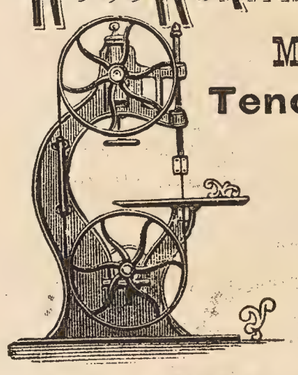

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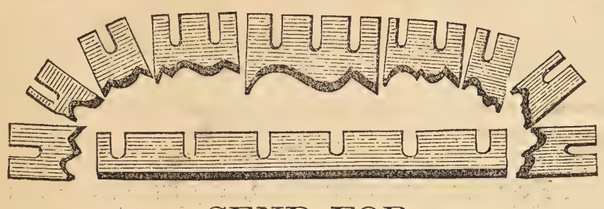

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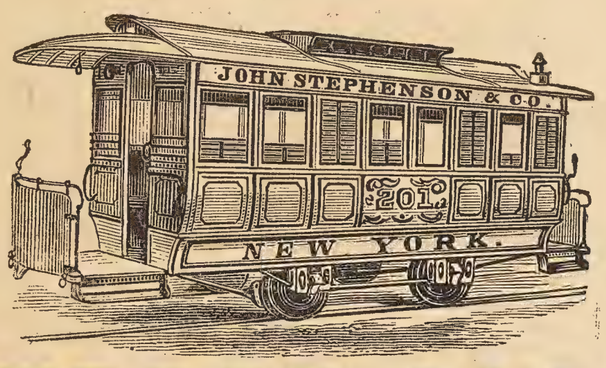

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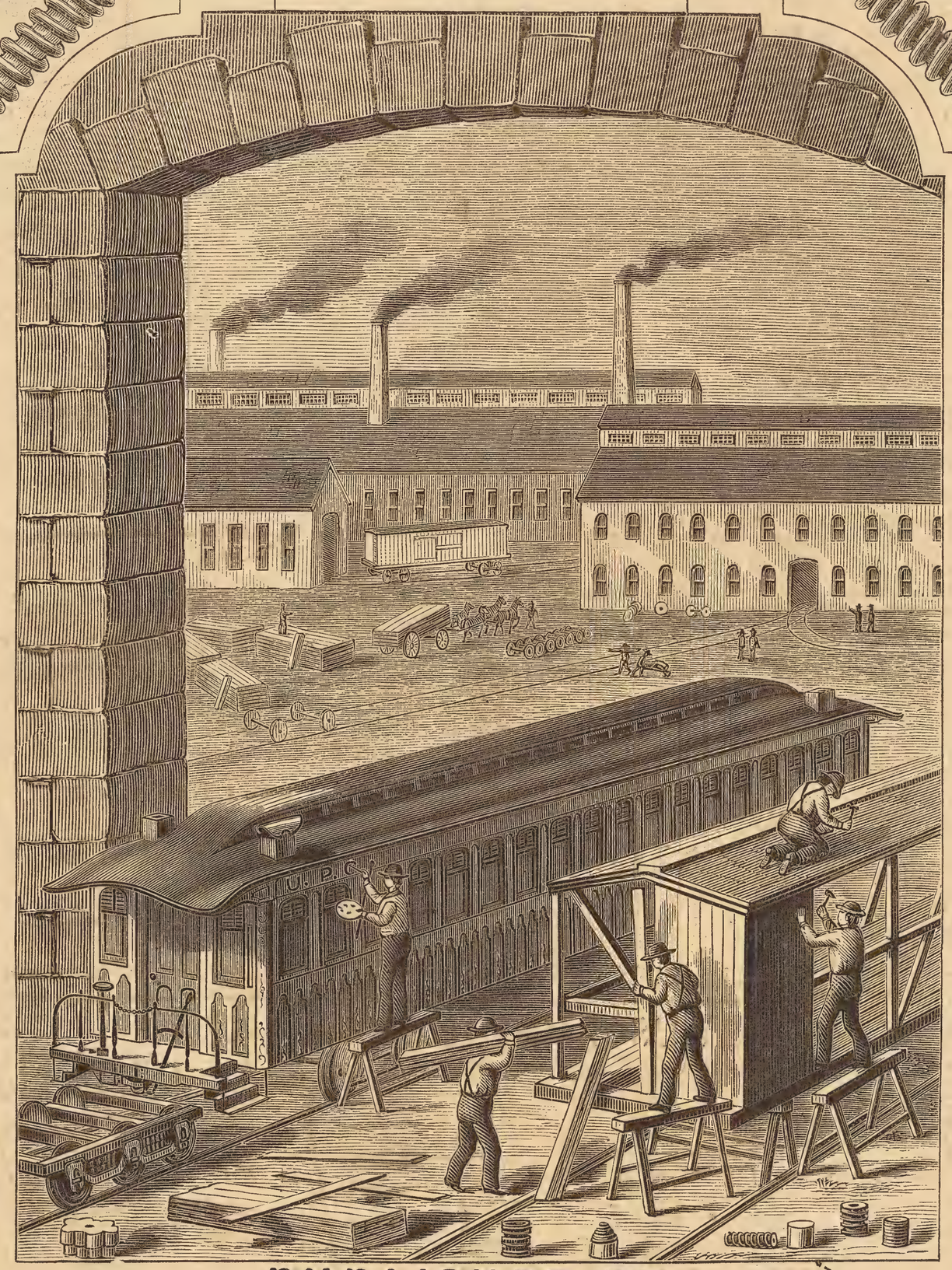

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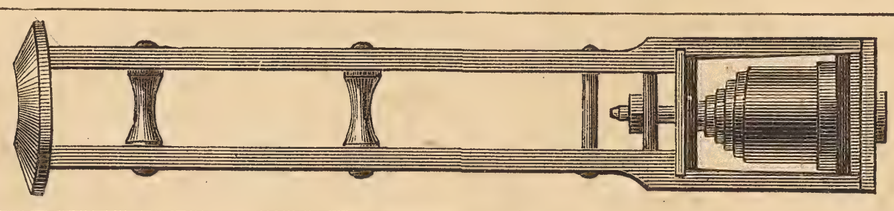

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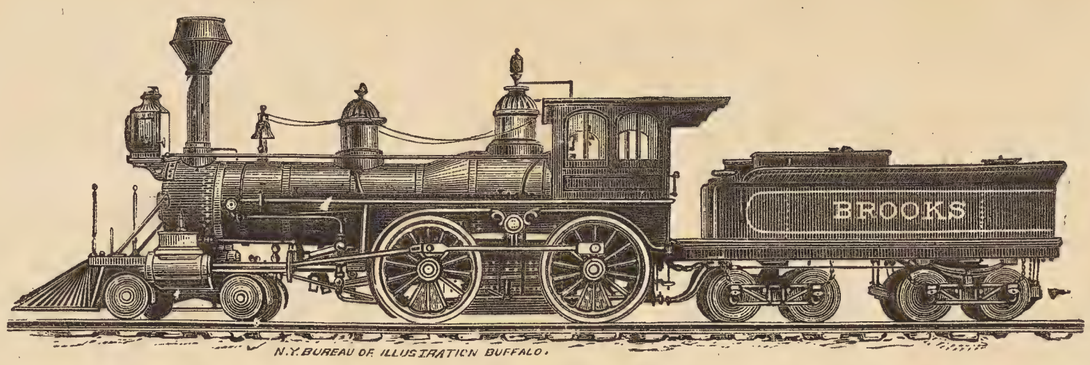

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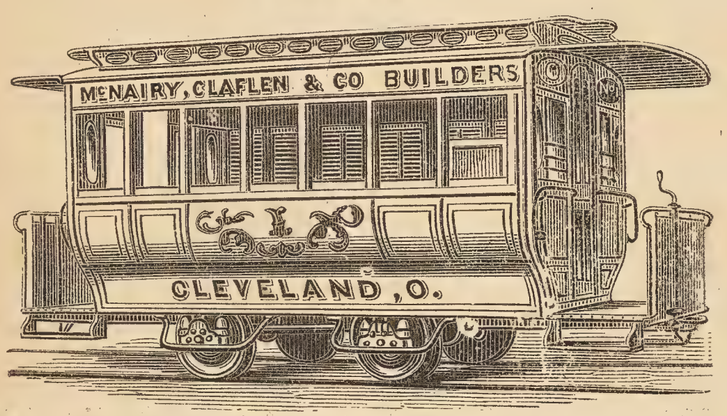

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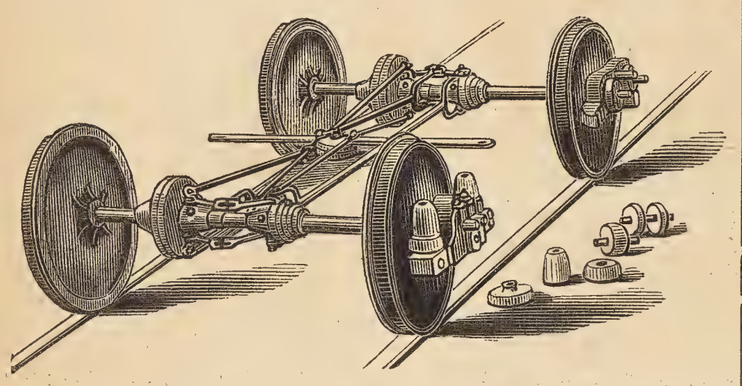

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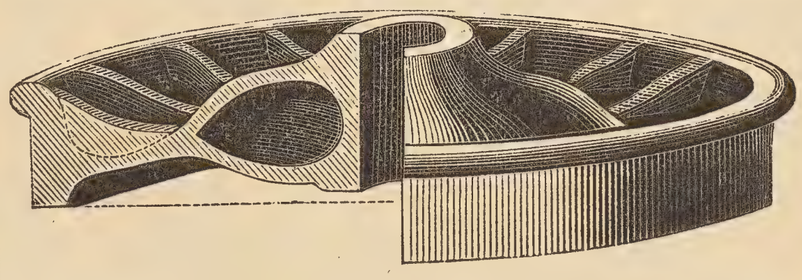

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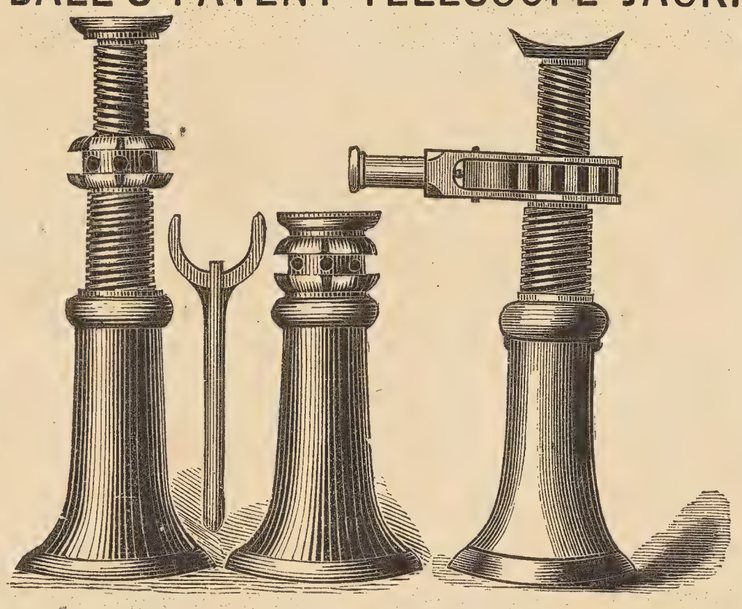

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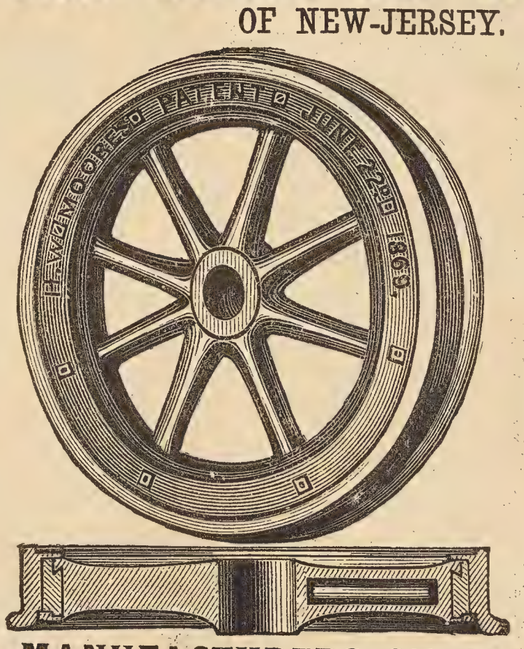

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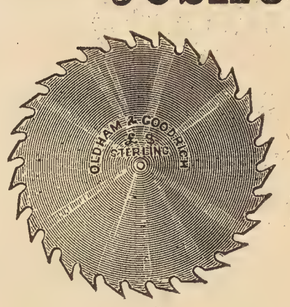

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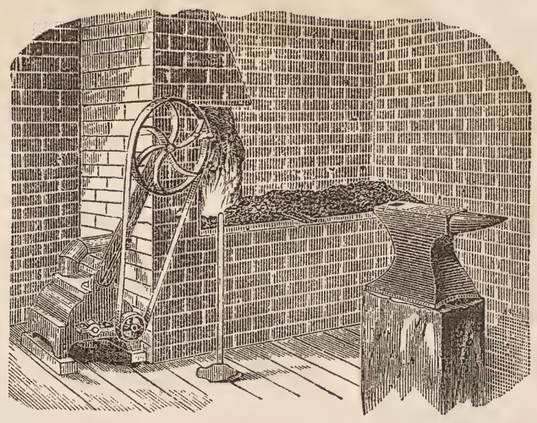

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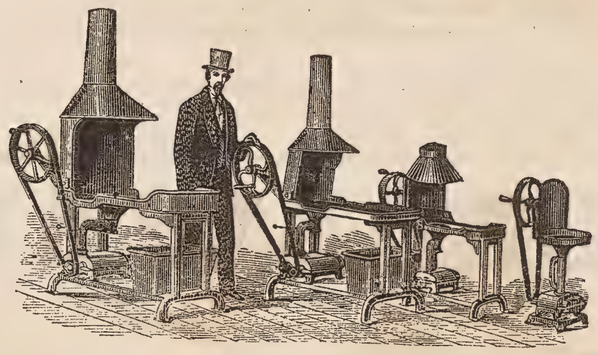

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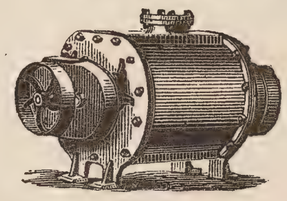
OF ALL  SIZES,

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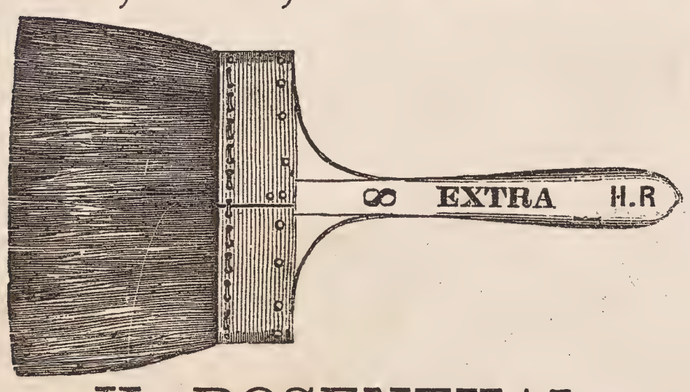

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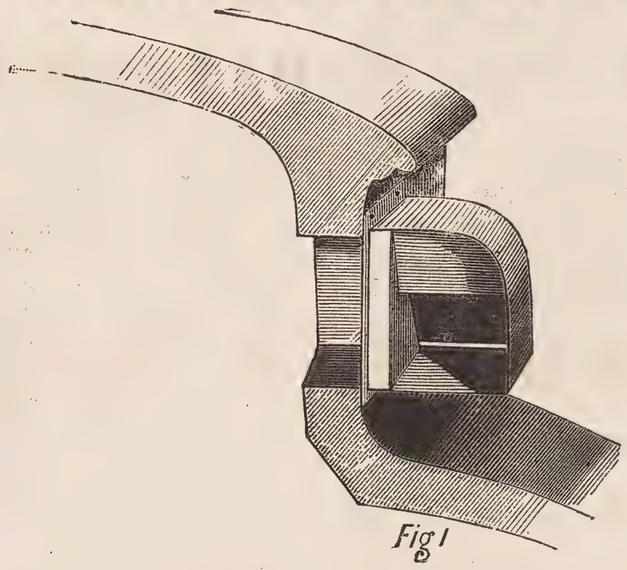

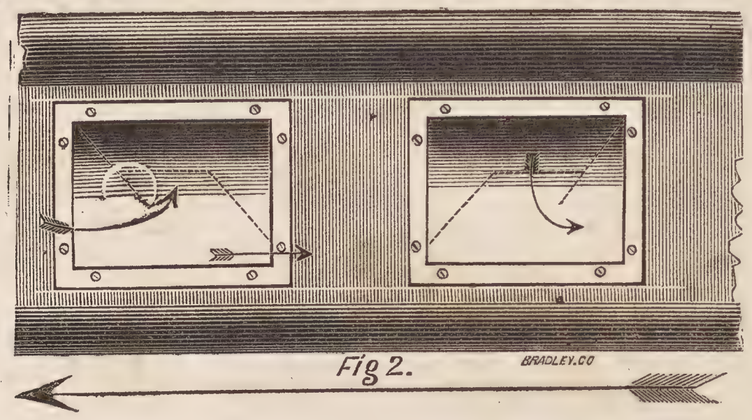

THE Ventilators are placed as usual in the car roof as shown in Fig. 1, their mouths facing alternately in opposite directions, those facing forward admitting the air, and those facing backward affording an exit. Fig. 2 represents a side section of the raised roof with two of the ventilators alternately arranged. When the car is moving in the direction indicated by the arrow, it will be seen, by the curved darts, that there is an ingress and egress of air constantly taking place. The operation of the ventilators is reversed with precisely the same effect, when the car moves in the opposite direction. The internal structure is such that the dust and cinders passing into the mouth of the ventilator are intercepted by striking against two shields, shown in Fig. 1, and indicated by dotted lines in Fig. 2, and are thus naturally thrown to the bottom, where they are carried out through a small opening as shown in Fig. 1, and by the straight dart in Fig. 2, a current of pure air being forced into the car at the same time through a lateral opening. The faster the car moves, the greater is the quantity of air admitted and expelled, thus securing a free circulation which does not subject the occupants to a direct current or draught. The ventilator is also noiseless in its operation. There is no clattering of valves, and no change is necessary when the car reaches its destination. Once put in place, it is always in readiness, and runs itself independent of all employees.

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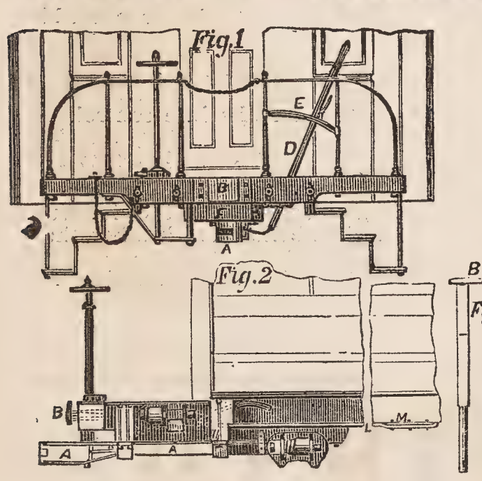

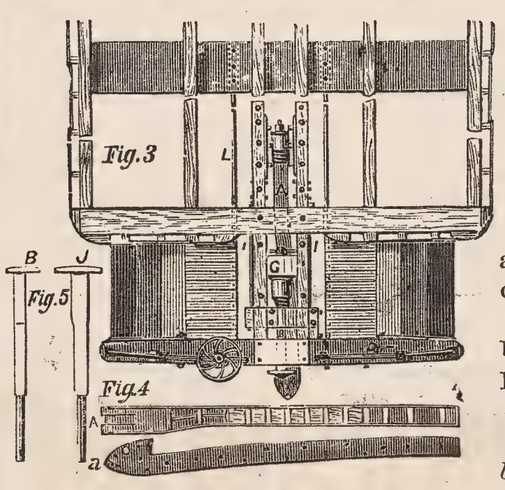

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DESCRIPTION.

Figure 1 is an elevation; Figure 2, a longitudinal section; Figure 3, a plan or an end of a car to which the arrangement has been applied; and Figures 4 and 5 show top and side views of the "Hook" and "Buffer," drawn on a larger scale than that of Figures 1, 2, and 3.

The letters refer to the same parts in all the figures. A is the coupling "Hook," B the "Buffer," C the "Stop," D the "Lever," E the "Quadrant Ratchet," F the "Truss Beam," G the "Spring Beam," H the "Suspender Beam," I the "Upward Trusses," K the "Main Spring," L the "Downward Trusses," and M the "Bolster."

The Platforms, instead of being located below the centre line of the main sills of the cars, are placed *in* that ine, and held there by the Trusses I and L, so that the point of contact (in Buffers B) is *in* the said centre line and *not below* it.

The coupling "Hook" A is attached to the draw spring the same as the ordinary draw head, and at the same height above the track, but in such a manner that the outer end is free to move aterally for a short distance. The Coupling Hook projects beyond the platform. The Stop C is placed under the Buffer Beam to prevent accidental uncoupling. When two cars are brought together, the Coupling Hooks, from *their shape*, push each other aside, until the Buffers B are compressed hard on the Buffer Springs, then—*the points of the hooks having passed each other sufficiently far*—the Hooks are carried forward by their main-springs, and thus the "*Coupling*" and "*Compression*" are both effected automatically *and at the same time*, and without the use of links and pins. When two cars are thus coupled together, the *head* of the *Hook* of each car is under the Buffer Beam of its opposite car, and the platforms are close together, (about 4 inches apart.) The effect of this is, *one platform can not be forced over the other*, nor can a *child* fall between the platforms; the dust and rain are nearly all shut out; the "Compression" makes the train run steadily, and prevents all jerking at starting and stopping.

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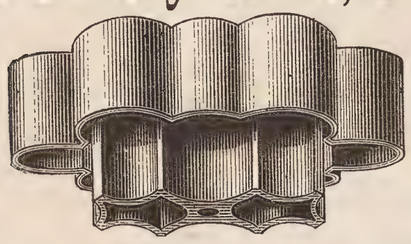
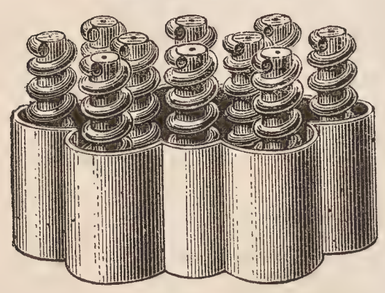
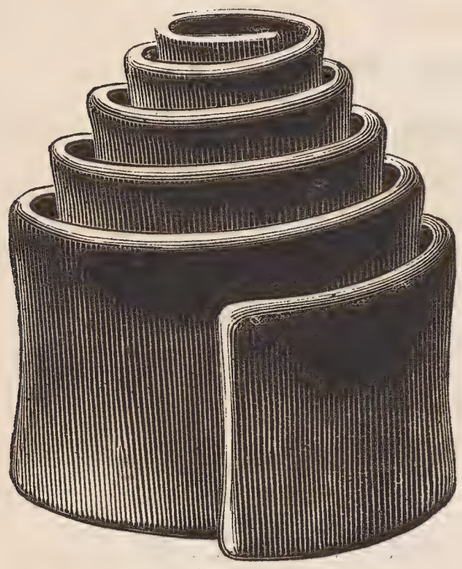




Group Rubber Centre Spiral Spring, (open.)



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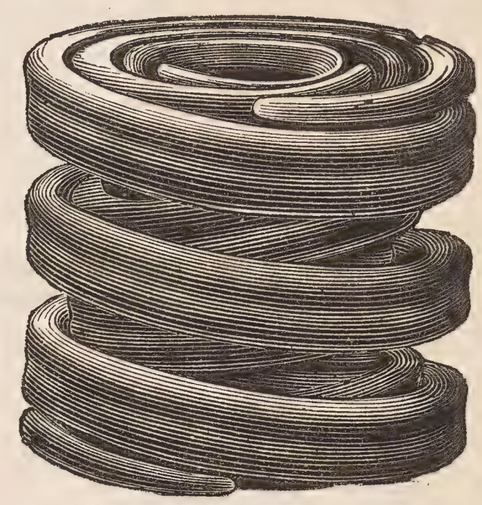

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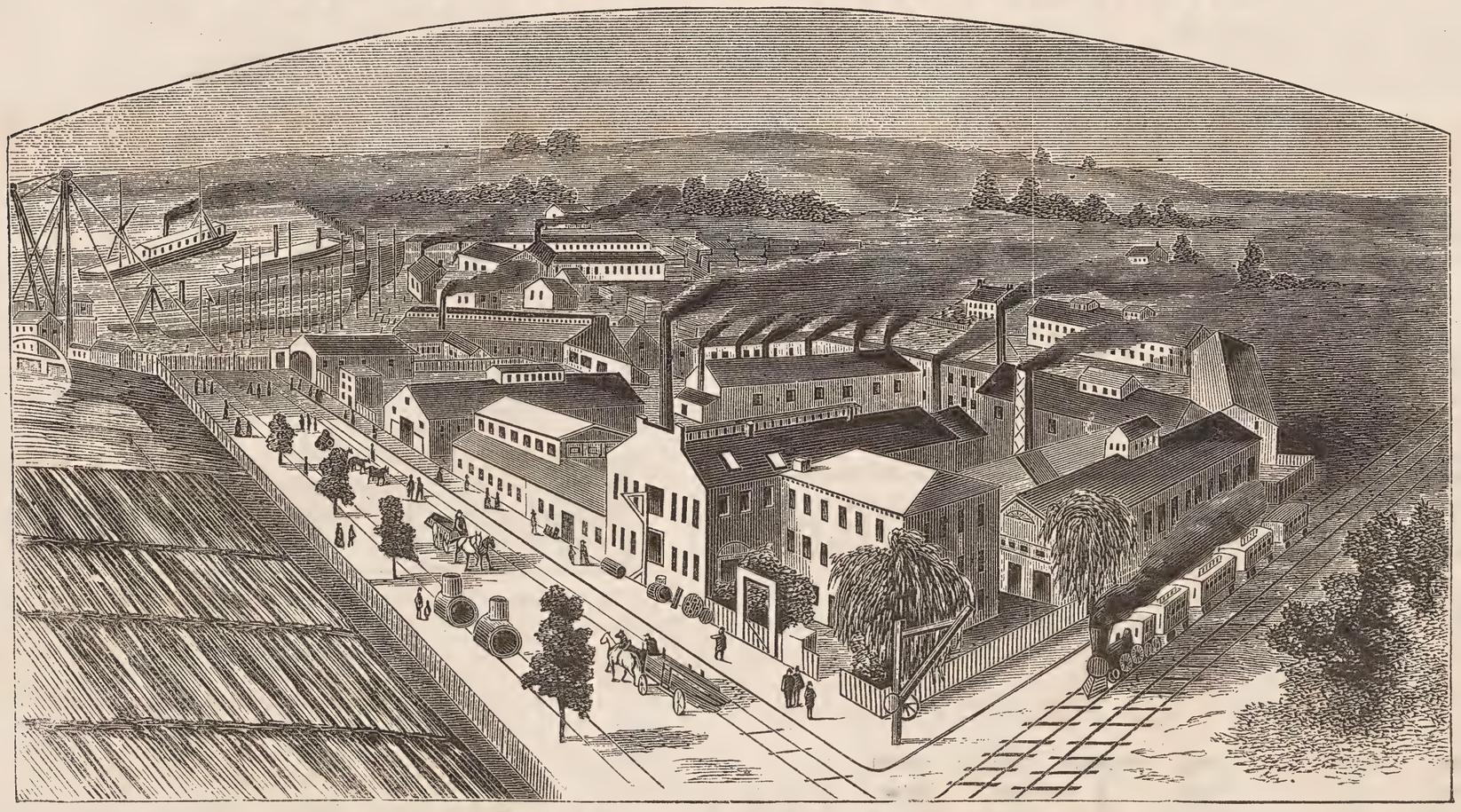

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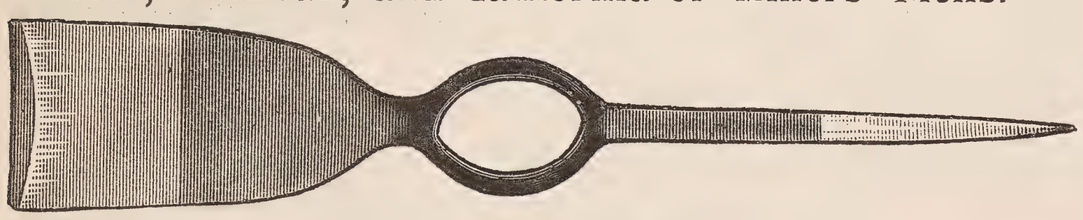

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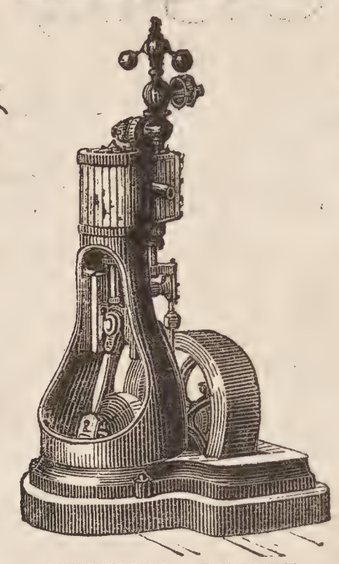

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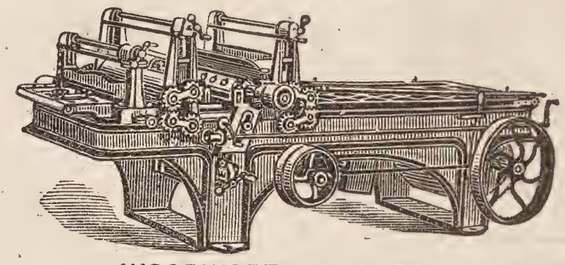
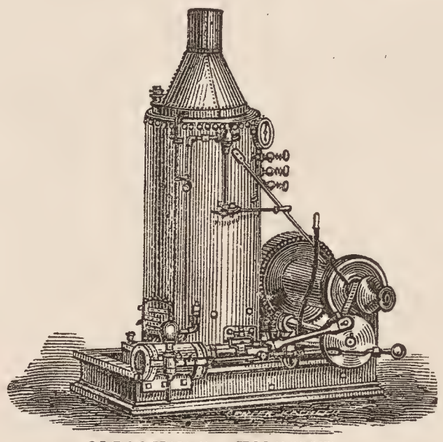
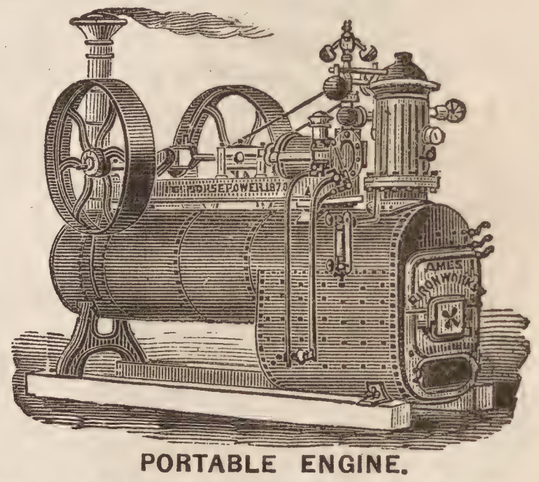


WOODWORTH PLANER.



HOISTING ENGINE.



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This wonderful system of cooking is patented by Captain Frederick P. Warren, of the Royal Navy, where it has been adopted by order, and also in the English Army, and is in universal use in families throughout Europe. In the few months since it has been patented in this country it is creating the greatest interest. A large number are already in use, and afford perfect satisfaction in every instance. Mrs. Henry Ward Beecher, in the *Christian Union*, gives it most favorable notice, and is now using one of the utensils. Send for descriptive pamphlet, embracing testimonials and prices to

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THE NATIONAL CAR BUILDER.

DEVOTED TO THE INTERESTS OF RAILWAY ROLLING STOCK.

Vol. III. No. 5. | NOVEMBER, 1872. | 50 Cents per Annum. Single Copies, 10 Cents.

The Mount Clare Shops of the Baltimore and Ohio Railroad.

WE copy from the *Railroad Gazette* the following portion of a lengthy article descriptive of these shops. They cover forty acres of ground and employ a force of 1700 men. Mr. Samuel Houston is the master mechanic of the Mount Clare shops, and Mr. John C. Davis is the master of machinery of the whole line of road.

FREIGHT-CAR SHOPS.

"The principal freight-car shop is built similar to an ordinary round engine-house, with a turn-table in the centre. Mr. James H. Miller is foreman of this work. The shop has sixteen tracks, five of which are devoted to new work, and the others to repairing old cars. From 65 to 70 new cars are built here every month, besides keeping up the repairs of the extensive equipment of the road.

"The freight-car truck used on this road is very different from that used elsewhere; but as we are promised a drawing of it, we reserve the description until the appearance of the engraving. The bodies of the box freight-cars for this road are made 30 feet long outside, by 8 feet 4 inches wide, and 6 feet 3 inches high inside, measuring from the top of the floor to the under side of the rafters. The weight averages 20,000 lbs.

PASSENGER-CAR ERECTING-SHOPS.

"The two buildings devoted to this work are built of wood, and are the only wooden structures of any considerable size about the place; all the rest of the shops are built of brick. They are located side by side, and are about 200 feet long and each about 75 wide. The passenger-car department is under the general charge of Mr. Jacob S. Shryack. The cars which are now made here are 51 feet 7 inches long and 9 feet 6 inches wide over the outside of the body. The seats are placed 36 inches apart from centre to centre, and are made 18 inches wide by 39 inches long, thus giving abundant room for comfort. We observed, too, that although the seats are not upholstered so as to be concave, they were made almost flat, with Cobb's elliptic springs, which are sufficiently flexible, so that the seat becomes concave with the weight of the person sitting on it.

"The cars have six-wheeled trucks with strong check chains attached, in which we find those in charge of the cars have implicit confidence. Fifty-four passengers can be seated, with a water-closet and two stoves. The outside sills are made $7\frac{1}{2}$x$5\frac{1}{2}$ inches; the intermediates, $7\frac{1}{2}$x$3\frac{1}{2}$ inches; the posts, 3x$1\frac{3}{4}$ inches; the 'edge-board,' $11\frac{3}{4}$x$2\frac{1}{2}$. The windows and doors are all made with semicircular tops. The doors have sliding sashes, which can be opened for ventilation. The raised roofs all have Creamer's exhaust-ventilator. His supply-ventilators are also placed under the eaves to admit air. The heating is done by ordinary cast-iron box-stoves of the plainest and simplest description, and are said to give excellent practical results.

"The cars are finished inside in walnut and satin-wood, and the panels are made of French walnut 'burl.' The doors are made of mahogany. The arms of the seats are wood, and the backs are curved so as to conform to the person of each passenger, and have locks with which they are fastened. The upholstering is secured with metal bands around the edges, and the head-linings are made by Howard, of Hartford. The finish and appearance of the cars is very showy—a little too much so to be in good taste; but it is what the general public like, which is the æsthetic standard for railroad companies.

"The water-coolers are enameled inside, and are made by a person who is so unwise as not to put his name and address on what he makes.

"About three passenger-cars per month are built here, which we believe are fully equal to those made at any other shop in the country.

PAINT-SHOP.

"We can say, we think without much fear of contradiction, that the paint-shop of the Baltimore and Ohio Railroad is the finest in the country. The plan is of the form of an L, the angle of which is somewhat acute. The length of it is 233 feet on the base, and 372 in the perpendicular, and the lower limb is 90 and the upper one 95 feet wide. In the lower limb, five tracks run lengthwise of the building, and there is room for three cars on each track. In the other portion of the building, there are nineteen tracks, which run crosswise of the building. There is, therefore, room for about thirty cars at one time. Under the portion which we have represented by the upper portion of the L is an extensive basement divided into rooms for storing and mixing paint, and for varnishing and upholstering. The paint is stored in a large fire-proof vault. The mixing-rooms are adjoining, and the varnishing-room next to it. This latter we think is defective in its arrangements for ventilation, for which no special provision is made. An examination of the room used for the same purpose by the Jackson & Sharp Co., of Wilmington, will, we think, suggest improvements in this respect, which would increase very much the efficiency and also the healthfulness of this room. In a previous number of the *Gazette* we described the arrangement used in Wilmington, to which those interested in it are referred. Mr. James Reeves is foreman of the paint-shop.

UPHOLSTERING DEPARTMENT.

"Two of the large rooms are used for this work, and every thing here is done in the most thorough manner. The best material is used, and good workmen employed. All travelers will realize the extent to which their comfort is dependent upon the work of the upholsterer. The rooms devoted to it are as orderly as any manufactory we were ever in, and few persons can realize the amount of material consumed in this department, without a personal inspection. Mr. O. G. White superintends it.

THE MACHINERY OF THE BALTIMORE AND OHIO RAILROAD.

"A railroad man visiting this road for the first time will find many things which differ widely from the practice of roads farther north. The Baltimore and Ohio Railroad was among the first projected in the country, and a portion was completed before locomotive engines were more than experiments, and there are now living in Baltimore many old citizens who will tell with great glee about the old cars which were for a number of years drawn by horses on this road. To the men who first constructed the road and the machinery which was used on it, much credit is due for their ingenuity and the rare ability which they showed in perfecting the machinery, road-bed, and equipment of their line. It must be remembered that every step in the early days of this road was an experiment, and in one of the first reports may be found a very able discussion to determine, or rather show, why it was better to have the flanges of the wheels inside instead of outside of the rails. The road was laid originally with strap rails on granite blocks. Cars were tried propelled by horses mounted on the cars and working on an endless-chain platform. Sails were used, and finally the board of directors offered a prize for the best locomotive, which was contended for by several parties, and which resulted in establishing conclusively the practicability of using steam for the motive power of their road.

"Owing to the steep grades and sharp curves, the construction of powerful locomotives presented many grave engineering difficulties, and the problems, which of late years have been so much discussed in Europe, were presented twenty-five or more years ago on the Baltimore and Ohio Railroad. Mr. Winans furnished a large number of eight-wheel connected engines for this road, many of which are still at work, and the merits of this form of engine, as compared with that of ten-wheeled engines with a vibratory leading truck, were very earnestly discussed by Mr. Winans during the administration of Mr. Henry Tyson, who was for a number of years master of machinery. The decision of the question was against the eight-wheeled connected engines, and resulted in the almost entire destruction of Mr. Winans's business. Since then, his shops have been torn down, and now no vestige of them remains, excepting the old building formerly used for a pattern-shop.

"The old gentleman, however, still lives, and his mind is as clear and logical as ever, and he is ready to, and does, maintain his opinions as earnestly and tenaciously as of old. He has of late years been devoting his time to the construction of dwellings for persons of moderate means, in which he has attempted to combine, as far as possible, all that is needed to make them comfortable and healthful. At present he is giving much time to the investigation and dis-

cussion of the improvement of Jones's Falls, so as to avoid all dangers from floods in future, one of which, it will be remembered, was very disastrous to the city of Baltimore a few years ago. Mr. Tyson and he are again on opposite sides, and to any who wish to study hydraulic engineering, and at the same time be diverted by a very earnest discussion, we recommend the current literature relating to this subject which has appeared in the newspapers and elsewhere in Baltimore during the past year or more."

New Chicago Car-Works.

THAT Chicago is rapidly becoming a very important manufacturing city is apparent to any one who will take the trouble to visit the South Branch of the Chicago River, at a distance of from four to six miles from the Court-House. Manufacturing establishments of great importance are opening up all along the river there, and millions of dollars are expended in the construction of buildings and the purchase of machinery.

One of the most important of these enterprises is the car manufactory of F. E. Canda & Co., which is situated on the north bank of the river, near Western avenue. The grounds cover 15 acres, and are accessible both to the largest vessels which sail on the lakes and by every railroad entering the city, by means of the net-work of roads that communicate with the Union Stock Yards.

The buildings which Messrs. Canda & Co. are placing on the ground are most excellent and substantial in their character, being of brick, with trussed roofs.

The shop where the wood-work in the car manufacture is to be done is a building 110 feet wide by 420 feet in length. In this the wood comes in at one end of the building in its crude shape, and is planed and sawed and fashioned and smoothed as it moves forward from machine to machine, until, as it reaches about the middle of the building, it is all ready to be put in its place in the future car. The north end of this building is to be used for erecting the cars.

One of the most curious things in this building is the Sturtevant blower, which, with its iron tubes branching from a large central tube resting in the truss-work of the roof, sucks up the shavings as fast as they are made and conveys them to a receptacle near the boiler-rooms.

Adjoining the wood-working department on the west is another building, 70 feet wide by 220 in length, which is being fitted up as a machine-shop and blacksmith-shop. The building is completed, and is in all respects as finely constructed as the other. The heavy truss-work is designed to hold the shafting so firmly that it will not need to be "lined up" after it is once got in place.

This iron-working department is being fitted up with all the most modern machinery for working that metal.

South of the machine-shop are the engine and boiler-rooms. The boilers are capable of generating steam for a force equal to 200 horse-power, while the engine, an improved 180 horse-power Corliss, has already been put in position to drive the machinery.

Adjoining the large wood-working building first mentioned is to be a planing and sawing-room, 40 by 120 feet in size, which is yet to be built.

A paint-shop, 160 by 150 feet in size, is in process of erection; also a drying-house and an office.

The transfer-table, which will transfer the cars from the place of construction to the paint-shop, and from the place of completion to the place of shipment, is 45 feet in width by 225 in length. The whole of the works will cover several acres of ground.

The machinery is now being put in place, and is of itself an object of great interest, being of the latest and most improved patterns in all respects. It consists largely of matchers and planers, from the Fay Works, of Cincinnati; Gray & Woods's dimension planers and surfacers, Daniels's planer, wood and iron cross-cut saws, a four-side inside moulding-machine, a four-rolled and a six-rolled match-machine from the Cooper and Mt. Vernon Iron-Works, Ohio. Besides these are car-tenon machines, Lane & Bodley mortisers universal boring-machines, universal wood-workers, three-side moulding-machines, Merriman bolt-cutter, screw-cutting machines, box-boring machines, bolt-pointing machines, horizontal borers, band saws, shaping-machines, jig saws, etc., and all the wonderful machinery which none but a machinist can fully comprehend.

In the iron-working department are drills, lathes, iron planers, shapers, hydraulic wheel presses, punches, shears, bolt-headers, forges, etc. The machinery is from many of the best manufacturers in the country, such as the New-York Steam-Engine Works; Pettingill, Glass & Co., Cleveland; Wm. Sellers & Co., Philadelphia; Columbian Iron-Works, Chicago; Industrial Works, Philadelphia; Lewis, Oliver & Phillips, Pittsburg. The forges in the blacksmith-shop are connected with a Sturtevant 8-inch blower.

The shops are calculated to construct and turn out each day 17 freight-cars; or 14 freight-cars a day with 6 first-class passenger cars per month.

The cost of the works will not be far from $250,000.

The machinery alone will cost about $80,000, it is estimated. A slip having 1800 feet of dockage, and large enough to accommodate the largest lake vessels, is now in process of construction, and will intersect the grounds in such way as to enable material to be landed in the most convenient places.—*Railroad Gazette.*

To Master Car-Builders.

THE following interrogatories, in the form of circulars, have been addressed to master car-builders and foremen of railway car-shops, by the chairmen of the committees of the Master Car-builders' Association, for the purpose of eliciting information on the several topics named, the importance of which must be manifest to every member of the association and all others who have any thing to do with the running, repairing, or constructing of any class of railway-cars. Replies should be addressed to the chairmen of the committees at as early a day as practicable, so as to be in readiness for presentation to the next annual meeting:

HEATING, VENTILATING, AND LIGHTING PASSENGER-CARS.

1st. How many cubic feet of fresh air do you think should be supplied to each passenger per minute, in order to keep the air in a car pure?

2d. In your opinion, what are the best means for admitting this quantity of air into, and what for exhausting an equal amount from cars, in cold weather?

3d. Have you heating and ventilation combined? if so, how is it accomplished, and what are the results?

4th. What kind of stoves and fuel do you recommend for heating cars?

5th. What, in your opinion, are the best means for protecting cars from the damage of fire, in case of accident to the train?

6th. How are the cars on your road lighted? with gas, candles, or oil? if the latter, what kind of oil?

7th. Please state how the cars on your road are ventilated and warmed, and the number which use the various plans, with the general results; and give any other information relating to these subjects which you may think will be valuable to the committee.

All replies should be addressed to

V. D. PERRY, *Chairman,*
Hartford, Prov. and Fishkill R. R., Hartford, Ct.

BRAKES.

1st. What kind of material do you use for brake-shoes? and what is your experience with such material?

2d. What method of hanging brakes is now used on your road, as applied to freight or passenger-cars, whether between or outside the wheels, on the truck end or to the carriage body?

3d. Do you use brakes on *both* trucks of such cars? and if so, do you connect them so they can be applied to all the wheels, from each end of the car?

4th. If applied to the wheels from each end of the car, does your connection equalize the pressure of the brakes on all the wheels? if so, please state your method of doing it?

5th. Do you use a safety-brake on your passenger-cars? if so, please state what kind, and your experience as to its working?

6th. Do you use a power or train-brake, which gives the engineer control of the train? if so, on what principle does it operate, and by what name is it known?

7th. Does such brake give the engineer entire control of the train, and is it reliable in all kinds of temperature?

8th. Please give any additional information that you may deem important to enable the committee to make a valuable report on this subject, to the next annual meeting of the association.

All replies should be addressed to

R. S. RAMSEY, *Chairman,*
Pennsylvania R. R., Pittsburg, Pa.

TRUCK AND CAR-BODY CHECK-CHAINS.

1st. In your opinion, are check-chains, as usually applied from trucks to car-bodies, an attachment of value as a safeguard?

2d. Do you think an attachment could be practically applied from trucks to car-bodies, so as to be of real value, should the wheels leave the track?

3d. Are truck check-chains used on your road? if so, how many to each truck, how applied, and at what angle would the truck stand to the car when the check-chains are drawn taut?

4th. Can you refer to cases where check-chains have been of service when cars have been thrown from the track?

5th. With your experience, would you advise that cars, in case of accident, (when the wheels are off the track,) should remain coupled or otherwise?

6th. Any other information bearing upon the subject, not suggested by the above questions, will be cheerfully received by the committee.

All replies should be addressed to

C. C. MILLAR, *Chairman,*
Cent. R. R. of Georgia, Savannah, Ga.

CAR ROOFS.

1st. Do you use tin or other metal or canvas for outside covering on passenger-car roofs? Please state the quality of the material you use, and how often it should be renewed.

2d. Please state how your standard freight-car roofs are constructed; of what materials; with average cost and durability of same.

3d. With your experience, what would you recommend as the best materials with which to paint metal or wooden car roofs?

4th. Is your road troubled with bills for freight damaged by water through leaky car roofs? If so, what is the cause of such leakage, and what would you suggest as the most effective and durable remedy?

5th. Please furnish any other information on this subject calculated to aid the committee in making a valuable report.

All replies should be addressed to

SAMUEL W. MYERS, *Chairman,*
Pennsylvania R. R., Harrisburg, Pa.,

THE business of the Chicago, Rock Island, and Pacific road already exceeds its capacity. The company has not cars enough to carry its freight, nor can it get them, the car-builders being already six months in arrears with their orders. There is much complaint among shippers because they can not get cars, and there is danger that many dealers in grain with small capital will go under because cars can not be had to take their grain to market, thus enabling them to promptly realize on their stock. The company is doing all in its power to accommodate the public, but the increase of traffic is more than was expected.

Improvement in Steam Boiler Furnace-Crowns.

THE main feature of this invention consists in a new method of attaching the crown-bars of the fire-box to the crown-plate, so as to supersede the necessity of washers around the bolts connecting the bars and plates, and around which accumulate the scales from the upper surface of the fire-box and other substances, so as, in connection with the washers, materially to affect the radiation of heat through the crown-plate to the water in the boiler. The object is to prevent this accumulation, and in case this should occur, the smooth surface of the plate permits the same to be easily removed by washing or otherwise.

Figure 1 is a half-sectional end-view of the crown-bars, as attached to the crown-plate of the fire-box. Figure 2 is an end-view of the fire-box with the crown-bars and the connecting bolts in proper position without washers on the crown-plate. Figure 3 is a plan showing the hollow crown-bars with the heads of the connecting screw-bolts. Figure 4 is a solid crown-bar, the shaded section of which shows the perforations as counter bored and the position of the connecting screw-bolt. Figure 5 is an upper section of the solid crown-bar, showing the perforations for the bolts.

When the ordinary skeleton or double crown-bar D D is used in connection with the improvement, the sides are connected by pieces of iron or steel A A, about two inches square and seven eighths of an inch in thickness—this size, however, to be varied as circumstances may require. These pieces of iron or steel are located between the inner sides of the crown-bar, about one and a half inches apart, and firmly attached to the inner sides by welding or otherwise, and extending through the length of the bars. In the centre of these iron or steel connections are vertical screw-threaded perforations, about seven eighths of an inch in diameter, and like corresponding perforations through the crown-plate, screw-threaded. These perforations are for the purpose of receiving a headed screw-bolt, threaded its entire length, passing through the crown-bar into the crown-plate, by which they are firmly connected together, as represented in Figure 1 of the drawing C C C C. These connecting bolts, at their upper ends, are properly headed, and rest upon square pieces of iron, through which they pass, as seen in Figure 1, C C C C. The lower ends of these bolts are screwed through the crown-plate and extend into the fire-box sufficiently to receive nuts on their lower ends, which are to be firmly screwed up to the plate; or the bolts may be riveted in the ordinary way to the plate.

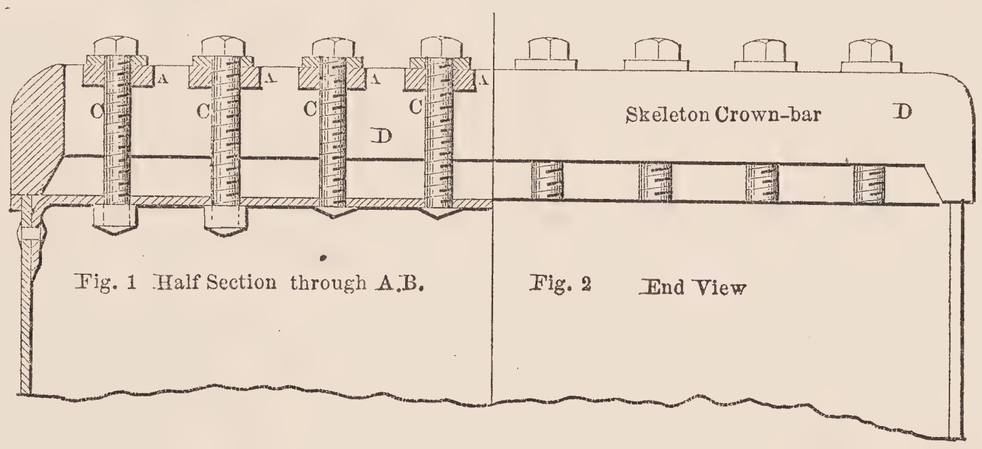


Fig. 1 Half Section through A.B. Fig. 2 End View

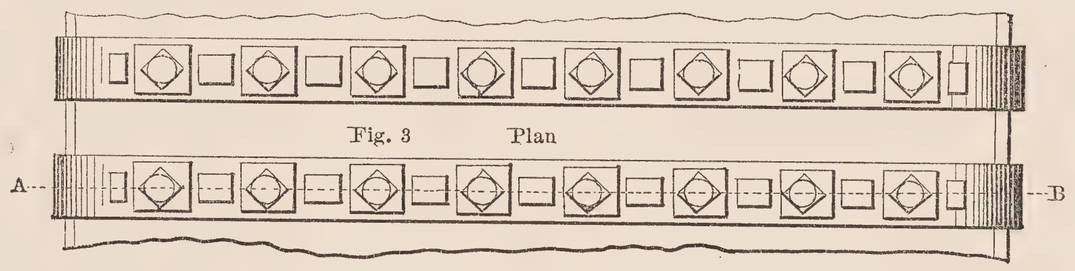


Fig. 3 Plan

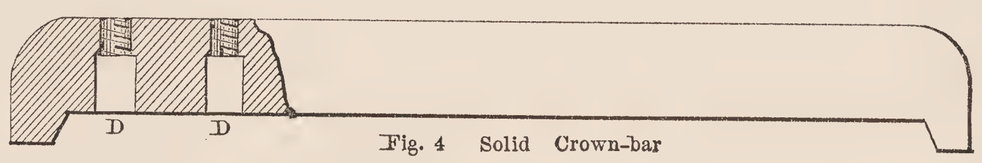


Fig. 4 Solid Crown-bar

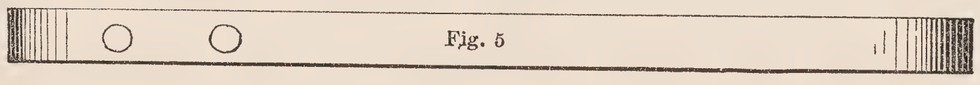


Fig. 5

When the crown-bars are not constructed as above described, but of one solid piece of iron, the perforations are counter-bored from the bottom of the crown-bar upward to seven eighths of an inch from the upper side. The space in the perforations, from the upper side of the crown-bar to the counter-boring, has the spiral groove, as above described, in relation to the hollow crown-bars, and for the same purpose, as seen in the shaded section of Figure 4 of the drawing D D. The proper adjusting of the screw-bolts and their positions in the crown-bars and through the crown-plate, and their mode of fastening to the crown-plate in the fire-box, are substantially as above described.

The old way of staying crown-sheet is by riveting the crown-bars to it. Washers 1½ by 2¼ are placed between, and bolts are dropped through the bars, washers, and sheet, and riveted underneath, the heads of the rivets being all there is to hold the sheet. About 100 bolts and washers are required in staying the crown-sheet of an ordinary locomotive. The area of sheet covered by the washers is 2¾ square feet, from which should be deducted the area of the bolts, showing that 2⅓ square feet of sheet is not touched by the water and is exposed to the greatest heat of the furnace. Mud and scale soon fill up the small space between the washers, and the result is that the sheet cracks from the bolts out, as all master-mechanics are aware.

In this improvement, the bolts C C are screwed into both crown-bars and plate for the purpose of avoiding washers. The double crown-bars D D, connected by the parts A A, are provided with screw-threaded perforations in combination with the bolts C C and crown-plate. Water comes in contact with the plate where it is most needed, and where it has hitherto been covered by the washers. The improved crown-plate will sustain two thirds more pressure than the old style; danger of explosion is avoided; scale can not form, and water has a free circulation on the sheet. Engines make steam much better, fuel is saved, and engineers have less trouble in carrying water, and these crown-bars are put on much cheaper than the old method.

Further information may be procured by addressing L. H. Waugh, Superintendent of Machinery of Kansas Pacific Railroad, Wyandotte, Kansas, who is one of the proprietors and patentees.

THE Grand Trunk Railway of Canada loses a very large number of iron rails every winter through fracture, attributed to the severity of the cold to which the line is exposed. A portion of the road has been laid with steel, and on this the proportionate loss due to the same cause is much smaller than on the iron track.

The Patten Car-Works.

WE chronicle herewith another addition to the list of regular car manufactories. The new works are located at Bath, Maine. They were commenced in June last, and are now in readiness to commence operations. The proprietors are G. F. & J. Patten's Sons.

The wood-machine shop is 150 by 75 feet in dimensions, and two stories in height. The erecting-shop immediately adjoining, is 220 by 75 feet, and has room for setting up eight passenger or sixteen freight-cars at a time. Both buildings are heated by a steam apparatus put up by the Walforth Manufacturing Co., of Boston. Two-inch water-pipes run the whole length of the building, the outlets 54 feet apart, with rubber hose on the posts, ready for instant use in case of fire, the whole being connected with one of Wright's steam-pumps in the engine-room.

The blacksmith and machine-shops are 180x50, the latter containing the engine and boiler. Fuel is supplied from the wood-cutting shop by Sturtevant's exhaust fan The paint shop is 162x75, with a capacity for six passenger or twelve freight-cars, and is also heated by steam. All the buildings have gravel roofing. The machinery is of the latest and most improved construction, and includes the usual kinds found in car-shops. Water is supplied by two artesian wells.

Mr. J. W. Trussell, of Augusta, late master car-builder of the Portland and Kennebec Railroad, is superintendent of the new works. Some of the finest cars now running east of Boston were built under his direction, and he is every way qualified for the responsible position he now fills. The machine-shop is under the direction of Elisha F. Mason, and the blacksmith-shop in charge of Timothy Wetherbee.

The proprietors of the new works are gentlemen of experience, capacity, and enterprise, and with the facilities at their command, they will, we doubt not, turn out work that will compare favorably with the best to be found on our roads.

Burlington and Missouri River Cars.

THE following extract is from a description of the shops of this company in the Burlington *Hawkeye*. The new passenger-cars are thus described:

"These coaches are forty-five feet in length, and are mounted on four-wheel trucks of a new pattern, designed by Mr. George Chalender, who has for many years filled the position of Master Mechanic of this road. It is so simple in form that it requires no skilled labor, and, in case of a break, it can be immediately and easily repaired. Another peculiarity of these cars is the introduction of an iron plate, running the whole length of the car between the floor and the windows. The old custom of wainscoting this space in wood is unsatisfactory, as the wood shrinks, leaving cracks through which thin drafts of air strike the feet of the passengers. The iron belt which surrounds this part of the car is calculated to obviate this difficulty. There is no doubt that these will be the most comfortable winter cars in use.

"As an illustration of the great labor expended on the finishing and ornamentation of these cars, we may state that each car receives on its outside fifteen coats of paint and varnish.

"Besides the passenger-coaches, the company are building several 'accommodating' cars to accompany freight-trains. These are also being constructed in finer style and with greater conveniences than heretofore. The freight-car department is building fifty new cars. These are being turned out at the rate of one each day. These cars are also mounted on a patent truck, another invention of the indefatigable George Chalender. The average cost of these freight cars is $840.

"Another feature of the present fall work is the changing of about 75 flat cars into coal-cars for the transportation of coal from the different Iowa mines eastward."

The Screw Brake.

SOME time ago we mentioned that a Massachusetts artisan was engaged in the invention of a railroad brake embodying the principle of the screw instead of the lever, as at present employed. Notwithstanding the difficulty of thus applying that power, in consequence of the fact that its pressure is absolute instead of relative, and that its effect would seem to be the subjection of running gear to sudden jerks and strains altogether incompatible with the idea of durability, we learn from private sources that a number of experts who have examined the drawings and models of the inventor, and partially tested the manner of its operation, agree in the opinion that he has discovered not only a new principle, but the correct principle. Of course it remains to be proved whether the same results can be obtained on the larger scale as those which, there seems no reason to doubt, have been obtained on the small scale. The inventor, however, is reported to have the most unbounded confidence in the success of his brake when it shall have been practically tested on ordinary locomotives and trains of cars, and he believes that it only needs such practical testing to insure its universal adoption, and its supersedure, at no distant day, of all other brakes now in use. The special advantages which are claimed for it are simplicity in construction and ease in application, rendering it comparatively inexpensive and placing it within the power of all railroads to adopt it for all trains, whether freight or passenger; that the screw being the principal mechanical invention employed, the power is communicated by a separate screw directly to the block of each car-wheel, instead of being applied, as by the lever, to all the wheels of the truck collectively; that the arrangement of the mechanism is such that it is not liable to get out of order; while if a single screw should fail to do its duty, only a single wheel would be affected thereby, all the other wheels being still effectively blocked; that its operation is quick and under full management; the pressure under the control of the brakeman being able to stop the rotary motion of the wheels before they have made half a dozen revolutions, while, if required, the power may be applied as steadily and gradually as power is applied by the hand in winding up a watch or clock. That it is equally as well adapte to the driving-wheels of locomotives as to car-wheels, thus putting the breaking up of a train, if required, within the control of the engineer; and that, while acting with as much promptitude and effectiveness as the air-brake, yet, unlike the latter, which can act only in connection with the engine, it is applicable to the engine, to a single car or train of cars, separately or conjointly. The inventor, who is a practical mechanic, has taken out letters-patent for his invention, a working model of which has been deposited in the Patent Office at Washington. It is understood that an Eastern railroad company will shortly test its alleged utility and superiority by subjecting it to a thorough trial on their locomotives and cars. Should it possess the advantages claimed for it, it will meet one of the most important wants of the time.—*American Manufacturer.*

Cheap Men and Small Wages.

THE employment of cheap men has been condemned as a prolific source of loss to railroad companies in the management of their property; yet how frequently is it found that incredibly small salaries are attached to positions of the highest responsibility, and men of rare executive ability are content to eke out a miserable—because discontented—existence on what would be deemed inadequate compensation for a first-class mechanic or artisan. A heavy pay-roll, as far as numbers are concerned, does not always indicate good management, and in very many instances detracts from the healthy condition of an office, inasmuch as the employees receiving small salaries, and in the majority of cases having large families, are continually thinking about other methods for procuring money, and can not identify themselves as closely as they should with the interests of their employers. Let it be said, for the sake of example, that a force of seventy clerks is occupied in the detail work of one department in a railroad office, with a pay-roll not exceeding $6500 per month, *quære*, could not the same work be performed more satisfactorily and more expeditiously by thirty-five or forty men, at a cost of only $5000 per month? Would not the company gain by an arrangement which stimulated men to increased exertion in its service, by banishing thoughts which are always coincident with the poverty at home? No man can work when he has to resolve himself daily into a committee of one upon ways and means; involuntarily his mind flies off at a tangent from his occupation, however monotonous and mechanical; unconsciously, perhaps, he becomes fretful and discontented, and being continually wrapt up in self, he becomes a curse to himself and a bane to society at large. This language may appear strong, but is justified by experience, and it would be well if Eastern companies would follow more closely in the wake of their Western contemporaries, at any rate in this particular, employing, if practicable, none but good men, at salaries which rendered them entirely independent of outside speculations. What has been said about the rank and file of railroad employees applies with equal force to the heads of departments—their salaries should be in every instance consonant with their responsibilities, and they should consider that their position precludes them from a direct or indirect alliance with any contract or enterprise in which the interests of their companies are involved. The holder of a government contract can not hold his seat in the English house of parliament, and a wise policy would dictate the non-identification of the executive officer of a company with any supply business or invention in the introduction and benefits from which his company might participate.—*Official Guide.*

The Classification of Railroad Cars.

THE cable announces that several English railway companies contemplate the abolition of class carriages and the adoption of the American car. Probably it is as yet a rather distant contemplation, for the average Englishman would just as soon think of swopping the magna charta for the declaration of independence, or Mr. Gladstone for Mr. Fish. But it is a serious and a practical question, whether the English traveling public would gain as much as they would lose by adopting the Yankee notion. That notion is a grand one, but in our opinion it is too expensive, and has been tolerated in this country a great deal longer than it ought to have been.

In the first place, it is a question purely of economy, not of caste, or class distinction at all. It is simply whether a road ought to furnish more than one assortment of accommodations. We don't think of caste when one of our dry goods firms offers prints at eight cents a yard and silks at $3. There is no caste in that. It is simply an endeavor to meet the desires of each man or woman and give them what they can afford. Neither is it caste when a man of wealth takes an orchestra chair and his stable-boy the amphitheatre; or when the head of a firm takes a body pew and his clerk a wing pew, or the former takes a hack and the latter a horse-car. In obedience to this fact or principle, we think it would be economical for all concerned if the classification of cars was adopted on American roads. Especially on the way trains out of the great cities, there ought to be plainly furnished, substantial cars for working-men, seats which could be afforded at a material reduction under the prices for the fine cars now in vogue. In Germany, where there are four classes of cars, the rates on the cheapest are so low that washerwomen often go by car to their work, with their tubs under their arms. Three classes, however, are sufficient—the Pullman car, the ordinary car, and a car with easy spring seats, not upholstered, and plain interior. We do not believe that the American working classes are so stupid as to feel any discredit at riding in a car where the mirrors and black walnut trimmings were dispensed with, if it was clean and somewhat cheaper. It is not unusual for students, clergymen, and professional men to patronize such on the continent for short journeys. We put the matter now solely on the ground of economy, and would not for the world recur to those annoyances which the delicate and feeble, or even the ordinary, daily-bathed, and refined "genteel" people suffer from the proximity of people who are not clean, and perhaps not sober.

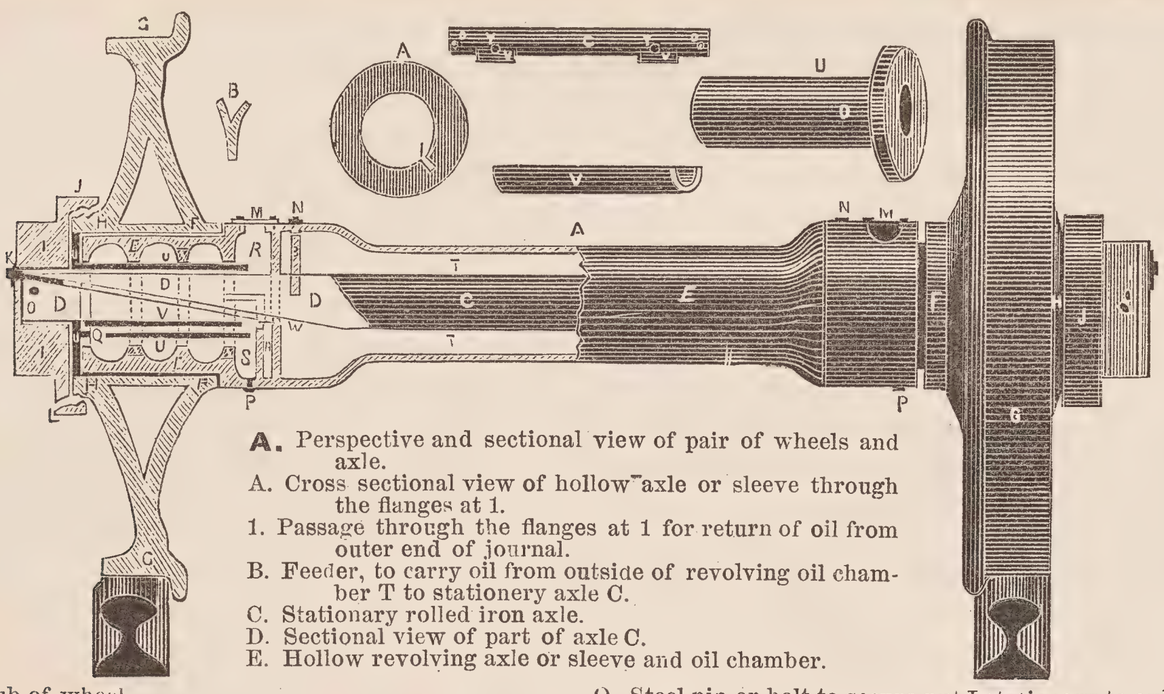
What the English and continentals need is not the indiscriminate system, but the classified American car. The European compartment car is an abomination. But if they will adopt our car and retain their classification, they will attain the acme of locomotive arrangement.—*Springfield Republican.*

Boston and Albany Locomotive-Shops.

THE locomotives built at these shops under the superintendence of the master mechanic, Mr. Wilson Eddy, are an interesting study, as they present many departures from the ordinary type of engine. They are not pleasing at first sight, owing to absence of steam domes, which are condemned for causing constant leakages, and producing weakness in the shell. The whistles and safety-valves are set in brass tubes shaped like a steamer's escape-pipe. Instead of the steam-dome, the steam-pipe is carried the whole length of the shell, and perforated on its upper side with small holes to admit steam. This pipe is of copper, and perfectly answers the purpose. The fire-box is four inches wider than in the ordinary way of framing. This is accomplished by flattening the frames as they pass the fire-box into four flat bars, two on a side. The upper ones are 7 inches deep by $\frac{7}{8}$ of an inch thick, and the lower ones 6 inches deep, with same thickness. These plates are bolted to the fire-box, and come as close to the driving-wheels as ordinary frames do, leaving all the space inside as so much gain for the box. The springs are hung in what may be called box-yokes directly under the firebox. The ash-pan is narrow, but that is of small importance compared with the advantages gained. The narrow pan, however, can hardly be charged to the general construction, as it is more from the arrangement of the feed-pipes than from the position of the springs. The pumps are beneath the foot-board, and are driven by eccentrics on the rear driving-axle. The cab is 7 feet $2\frac{3}{4}$ inches wide; the foot-board 4 feet 4 inches wide, and the seats $17\frac{1}{2}$ inches. The standard passenger-engine on this road has 5 feet 6 inch drivers, with 17-inch cylinders, and 26-inch stroke. At the time we were in the shop, a freight-engine was nearly finished, with 4 feet 6 inch drivers, four in number, and 17 by 26 inch cylinders. Objections have been made to this style of engine, but a very satisfactory answer seems to be that a year's repairs can be made in six days or thereabouts; that is to say, when an engine has run twelve months, it is in the repair-shop but six days to be put in a condition to run twelve months longer. We have been told by parties not connected with the road, and of good authority, that these engines are very powerful, being often much superior to large ones with a greater number of wheels. They steam freely, and seem to be generally liked on the road. The shops turn out about twelve of them a year.

The blacksmith-shop contains some good machinery, including a Miles & Ferris steam-hammer, 21-inch stroke and 600 pounds head, and a drop-press, which is a valuable machine. All the locomotive and tender axles are made here, also a few freight axles. In 1871, the shop turned out fifty tons of coupling-pins, which is about the yearly average.

ONE car-load of poplar lumber was shipped from Indianapolis to San Francisco, Cal., the other day, the freight on which was four hundred dollars. They have no poplar growing west of the Rocky Mountains, and have been shipping it round Cape Horn altogether till recently the Overland Railroad has transported large quantities to the Pacific slope.



A. Perspective and sectional view of pair of wheels and axle.
A. Cross sectional view of hollow axle or sleeve through the flanges at 1.
1. Passage through the flanges at 1 for return of oil from outer end of journal.
B. Feeder, to carry oil from outside of revolving oil chamber T to stationery axle C.
C. Stationary rolled iron axle.
D. Sectional view of part of axle C.
E. Hollow revolving axle or sleeve and oil chamber.
F. Inside hub of wheel.
G. Wheel.
H. Outside hub of wheel.
I. Nuts which support the truck frame, and hold the wheels to gauge.
J. Flange to conduct waste oil to opening L.
K. Plug to keep dust from oil chamber.
L. Opening for discharge of waste oil.
M. Capped opening into packing chamber.
N. Plugged aperture through which feeder B is inserted.
O. Steel pin or bolt to secure nut I stationary to axle C.
P. Plugged opening to sulphur or "dope" chamber.
Q. Opening in box U for return of oil.
R. Packing chamber
S. Sulphur or "dope" chamber.
T. Oil chamber in hollow axle.
U. Box.
V. Steel casing for axle C at the bearing inside of Box U.
W. Oil-conductor to chamber T.
Y. Dowel pins to hold steel casing V in place.

New Car-Axle and Oil-Box.

PRACTICAL railroad men have, for many reasons, a confirmed distrust of any plan which proposes to supersede the present rigid wheel and axle in universal use on our railways. Every attempt heretofore made in this direction has involved so many objectionable features, real or imaginary, that they have been regarded as impracticable by the great majority of intelligent railway mechanics. The disadvantages inseparable from the solid wheel and axle are admitted; but as regards practical utility and the essential requirements of safety, durability, cheapness, and simplicity of construction, the present method is considered superior to any of the devices that have from time to time been proposed on the basis or principle of a movement of the wheels independent of the axle. It is not reasonable, however, to suppose that in this fertile age of invention, as displayed in every department of mechanical activity, there will not be, sooner or later, some modification at least of the present system, if not a radical change in construction, that will meet the demands of a practical test and be recognized and adopted as a permanent improvement.

Such an invention is claimed to have been made, and has been patented under the name and title of "The Doty & Miltimore compound car-axle and oil-box, with independent wheels," and which we deem of sufficient importance to merit the attention of our readers and railroad men generally. Its satisfactory working is vouched for by railroad mechanics and officials whose opinions are authoritative, and who have subjected it to a thorough practical test. The details and peculiarities of its construction can be understood by the accompanying cut, in connection with the following extracts from the proprietor's circular:

"The inside axle C (of rolled iron, not turned) is made stationary and immovable, and solid to the truck frame, through the medium of the nuts I, which can be cast of proper shape to fit in the pedestals, and take the place of the old oil-wells. Around the stationary axle C is placed the revolving axle or sleeve E, reaching *through* the hubs of the wheels to the nuts I. Upon the journals at each end of the sleeve are *loosely* mounted the car-wheels. The wheels and sleeve all *revolve together* around the stationary axle, *as one piece*, except when one wheel is *larger* than the other, or is compelled to travel *further* than its mate in going around a curve, when one or both wheels turn on the sleeve to the same extent that one or both would be compelled to slip on the track had the wheels been solid to the axle. The weight of the car is supported by the solid axle, while the revolving axle supports the wheels in a perpendicular position, and, with the nuts I, holds them to the gauge. As the sleeve always revolves around the stationary axle, the wear comes at the journal between these two axles. To prevent the wearing out of these axles, a steel casing V is fastened to the under side of the stationary axle, and a hollow box or bushing U is inserted in each end of the sleeve. Both these pieces may be readily replaced at a very small expense, when the axles are again as good as new. It is therefore safe to say that the axles will not wear out. The steel casing and box, after running 50,000 miles, are to all appearances as good as new, and will undoubtedly outwear a large number of the boxes now generally used.

"At a speed of ten miles or more per hour, the oil in the chamber T revolves with the sleeve, and forms a uniform stratum of oil around the inner surface of the sleeve The feeder B, which is *stationary* with the axle C, continually discharges a stream of cold oil upon the axle C, and through the packing in the chamber R to the journal. When a speed of less than that mentioned is run, the capillary attraction of the 'waste' in the chamber R supplies the journal with a sufficient amount of oil. As long as there is oil in the chamber, a constant supply is forced into the box U at the inner end, passes through the box to the outer end, when the most of the oil returns to the oil-chamber, through the opening Q in the box, and the passages 1. A very small amount is carried through and out of the box by the lateral motion of the solid axles through the sleeve, which lubricates the surface between the face of the nut I and the flange of the box U, and passes off through the opening L to the ground. Thus a full supply of oil is constantly in the box, and only a very small proportion allowed to escape. The bearing between the wheel and sleeve is sufficiently lubricated by a portion of the oil after it has passed through and oiled the surfaces between the flange of the box and the face of the nut. The 'waste' in the chamber R will not need renewing, as no dust, dirt, or impurities can reach it. A great saving in oil and waste is thus effected, as the common box needs frequent oiling, and the waste must be often changed. One quart of black Virginia oil in the chamber has run an axle and a pair of wheels 8,000 miles, and while there is oil in the chamber, it is *impossible* to run at a speed that will heat the boxes."

"The nut I is secured to the axle C by a solid inch steel bolt O, which is of ample strength to resist any strain that can be brought against it. The bolt or pin is held in place by the pedestals or truck-frame. To change a wheel, it is only necessary to raise the frame clear of the nut I, drive out the pin O, take off the nut I, remove the wheel, and replace it with another. Then replace the nut and pin, and the work is done."

It is claimed in behalf of this improvement, that it is superior to the common rigid wheels and axles in many respects. It saves at least five per cent of propelling power on a straight track, and from twenty-five to fifty per cent on curves, as well as a corresponding amount of wear and tear of wheels and track. It has greater durability, the wear of the journals is less, with less liability to breakage; the twisting strain on the axle is obviated, as well as the crystallization of the iron and heating from hot boxes. It provides more bearing-surface for the work to be done, with proportionately less friction. The journal is of hardened steel, instead of soft wrought-iron. The expense of repairs is greatly diminished, for the reason that the wheels will last twice as long, and the boxes outwear a dozen of the ordinary ones. The sleeve will wear a number of years, and the stationary axle will not wear out at all. There is no bursting of wheels by the intense strain of forcing them on the axle; much oil and waste are saved, and the running of a car on loose wheels gives it an easier motion more agreeable to passengers. The cost of construction is at present a little more than that of the ordinary axle; but with proper machinery and facilities can be made to cost less, saying nothing about the saving in its use in other respects.

The first experiment with this improved axle was commenced more than a year ago on the Chicago, Burlington, and Quincy Railroad, by placing it under a baggage-car running daily between Chicago and Mendota, since which time it has been in constant use, running a little over a thousand miles per week After eight months', and again after thirteen months' service, it was carefully examined, and the wear found to be so slight as to be scarcely perceptible. It is still running, gives no trouble and receives no attention, and bids fair to outwear the tread of the wheel many times. This is substantially the testimony of Mr. Robert Harris, the general superintendent of the road, and Mr. C. H. Hudson, the division superintendent. Three passenger-coaches and two baggage-cars of the same road have recently been equipped with the axle, and are now running regularly between Chicago and Aurora, making a round trip each day. We are also informed that the road has purchased the right and is now fitting up its rolling-stock with the axle.

We have not the space nor the data for comment upon this important improvement. We are aware that many plausible if not well-founded objections can be urged against any departure from the present method, and especially such a radical one as is here proposed. In practical railroading, performance is the final test, and all proposed innovations and improvements must stand or fall by it. If this particular one is really what is claimed for it, it will vindicate itself.

Any further information may be obtained by addressing the Compound Car-Axle Company, Room 24, Bryan Block, Chicago.

Water-Tank Indicator.

AN electrician employed by the Chicago, Burlington and Quincy Railroad Company has patented an electrical apparatus, which is attached to water-tanks to indicate the moment when the tank is full. The instant the water reaches the point established as its limit of height in the tank, a bell begins to ring and continues ringing until the water is drawn down or the bell switched off. Thus the pumper is informed instantly of the time to cease pumping, even though he may be at some distance, or the weather dark or foggy.

The Chicago, Burlington and Quincy Railroad Company have in use a number of tanks, and it is said they have never once failed. A small battery is used, which is kept in the pumper's room, and the cost is said to be little more than the ordinary float, pole, etc. A company called the "Electric Improvement Company," in Galesburg, Ill., is manufacturing and selling the apparatus.

Louisville, Cincinnati, and Lexington Railroad Day-Coaches.

LOUISVILLE, KY, Oct. 10, 1872.

EDITOR OF THE NATIONAL CAR-BUILDER:

DEAR SIR: Among the Western roads that are building their own cars, none have been more actively or successfully engaged than the Louisville, Cincinnati, and Lexington, the shops of which are located at this place. Notwithstanding the increasing demand for cars on this line, resulting from the steady growth of business upon its several branches, the company has, under the skillful management of Mr. S. S. Pilson, the master car-builder, succeeded in equipping the road with box, flat, and stock cars, besides keeping up all necessary repairs. In addition to this, the shops are now engaged in the construction of several elegant day-coaches, a brief description of which may not be without interest to your readers.

In every important feature these coaches are alike, differing only in some of the minor details of interior decoration, so that a description of one will afford a very correct idea of each and all. The one we had the pleasure of inspecting is 55 feet long, 10 in width, and 9 feet 6 inches from floor to dome. The distance from floor to cornice is 7 feet 6 inches, while the arch in the roof carries the carlines 3 inches higher above the floor in the centre. The framing above is ash, the sills are yellow-pine, and the transoms are oak. The iron-work in the frame consists of 4 swivel truss-rods running lengthwise of the car below the floor, and hog-braces between the framing of the sides. The carlines running crosswise of the dome are of iron, cased in walnut and ash, with a paw bolted to the plate at the sides to prevent the car from spreading There are three tiers of flooring, the first of pine laid crosswise between the sills, the second of oak laid diagonally so as to hold the nails of the third floor, which is of yellow-pine and securely nailed through the oak. This third or upper floor is also laid diagonally, but in a reverse direction to the oak. The interior finishing is in walnut and cherry, with raised panels of ash-veneering, producing an effect exceedingly tasteful and elegant. The head-linings, in connection with the colored glass lights in the dome, display great artistic skill in the selection and blending of the colors, and is one evidence of the progress that is being made in these special features of car decoration. The mirrors, of which there are two at each end of the car, are very neatly fitted with an arched base, corresponding with the form of the panels and the curve of the moulding over the windows.

The car rides upon six-wheel trucks of the best and most improved construction. The safety-chains are attached by a wrought-iron strap, with a twisted hook at the end, the strap running lengthwise of the end timber and preventing the possibility of its being wrenched off, as is apt to be the case when the hook is bolted directly through or across such timber. Elliptic springs are used for the bolsters, and Dinsmore springs on the equalizers.

The effect of the outside finish of these coaches, both body and truck, is exceedingly elegant. The ground color is burnt umber, which is illuminated with gold and interlined with Turkish drab. In excellent workmanship, style of construction, ornamentation and finish, they are not surpassed by the best day-coaches to be found on any road East or West.

KENTUCKY.

Skeleton Self-Acting Railway Coupler.

THERE was had at Louisville recently a test by prominent railway men, and practical men withal, of a newly-invented self-coupler for cars, which has recently been put on the coaches of the Louisville, New-Albany, and Chicago Railroad. It is the invention of a Louisville mechanic, Mr. H. E. Marchand, and is as ingenious as novel. It is made of wrought-iron, and weighs about ninety-five pounds, with fixtures and all complete. The coupling is made by a bar or tongue, about eighteen inches long, which slides into a socket with infallible accuracy, and to uncouple a train it is only necessary to pull a wire worked from the platform or top of the cars; or if cords are placed upon the wire, the engineer can manage the coupling with but little trouble. With this invention all lost motion is taken up. This link or tongue will wear equal to a half dozen of the old style. The engineer is enabled to couple any number of cars without any assistance whatever, thus saving all crushed fingers, heads, and hands, as it is not necessary to go between the cars to make the coupling, the whole apparatus being worked by the engineer, or from the platform of the car by a brakeman. It is no more complicated than the common bumper; it couples itself, and can also be coupled with a link similar to the old couplers. It is impossible for the couplers to get out of order without breaking the whole car. It does away with 'winging', from the side, which frequently causes cars to jump the track. It is simply impossible for the human hand to accomplish the same work with like precision, and this coupler can be changed instantly from the self-coupler to the common coupler. Should danger present itself, any passenger can uncouple it, and by so doing save the lives of many persons. In "making a switch" the couplers were thoroughly tested, and performed well and to the satisfaction of all the gentlemen present. General Minty, Superintendent of the Louisville, New-Albany, and Chicago Railroad, expresses himself as much pleased with the action of the couplers. All of which the Louisville *Ledger* states.

Lubricating Experiments.

THE *American Chemist* says a very elaborate series of experiments was recently made in New-York to test the relative value of different lubricators. The experiments were continued during a period of fourteen months. The following were the general results and inferences: The consumption of oil varies with its temperature when applied. Winter sperm-oil sustained the heaviest pressure, and was taken as the initial comparison for all others, and their percentage of lubricating value determined by it. The tests of mineral oils and mixtures of animal and fish-oils with them would not sustain an equal pressure with the sperm, when equal quantities of the oil were applied, without rapidly increasing the temperature of the journals and producing an abrasion of their surfaces. When the pressure on the bearings are made equal with winter sperm, it required from 100 per cent to 400 per cent increase of oil to keep the temperature of the journals below 100 deg. Fahrenheit. Experiments were made at various velocities with the same oils. The results proved that as the velocity was reduced the pressure could be increased, and the relative consumption of oil, applied at equal temperatures, was decreased in almost equal ratio.

Novel Caboose Cars.

A SET of conductors' cars has been supplied for freight-trains on the Great Western Railway of Canada. These cars are divided into two compartments. One, smaller than the other, for the accommodation of the conductor and his men, is fitted with stove, comfortable seats, writing-desk, wash-stand, and locker, a brake-wheel perpendicular like a ship's wheel, in addition to the usual platform wheels, so that in bad weather or in an emergency brakes can be applied as soon as asked for. The compartment is also fitted with projecting side-windows, so that the occupants command a view front and rear. The lamps that light the compartment shine through red glasses in the end of the car, thus serving as guard lights. In the larger compartment one side is fitted with seats for passengers; on the other side are lockers, the lids of which are stuffed to serve as lounges, so that the train-men have each a locker wherein to secure his personal effects, and at the journey's end they can make up their beds on the lounges and lay their weary forms to rest—a vast improvement on the old plan of wandering, when worn out by fatigue at unearthly hours, in search of boarding-houses or hard-board couches or over-populated bunks. The compartment also contains the usual filter, stove, and saloon accommodations. Under the body of the car is a receptacle for auxiliary material.

A new arrangement of engine lights has been introduced. Each engine head-light shows on a bar fixed across it the number of the train, so that parties along the line and in charge of trains have no excuse for not knowing what train is passing. The head lamps are fitted with red shades, which are applied when the engine is running on or blocking the main line, and taken off when the engine is on a siding. The drawback to this arrangement is that red lights are not visible at so great a distance as white ones.

Postal Cars.

BUT few persons have any idea of the importance of a car in the front of a mail-train, wherein stands the route agent, with nimble fingers tying and untying bundles of letters and papers with a rapidity which seems to the uninitiated little short of miraculous. The thoughts, hopes, fears, and intimate business affairs of thousands pass through his nimble fingers, only removed from his perusal by a thin envelope. A mistake on his part as to the direction or destination of a letter may involve the loss of property or even life, to say nothing of the hope deferred which maketh the heart sick. The cars for the postal service are very comfortably and conveniently fixed. A movable lounge occupies a place at one side, while in winter a ruddy little stove, securely fastened down, dispenses warmth throughout the entire apartment. In the front part of the car is a washstand and closet arranged with every regard to cleanliness and comfort. In fact, the agent gets to look upon his car to some extent as a home, and always takes pride in keeping it neat and orderly. These traveling post-offices have been in use but a comparatively short time, yet they are rapidly growing in favor and importance, and doubtless will in a few more years be still further improved and regulated.

A Chance for Settlers.

THE Burlington and Missouri River Railroad Company are selling to actual settlers large quantities of land along the line of their road, at low prices, on ten years' credit, at six per cent interest. In order to give Eastern people an idea of the products of Iowa and Nebraska, and the capacity of the soil through which the road runs, the company have recently forwarded from their land office in Burlington thirty large packages, containing numerous specimens of grains, fruit, and vegetables, for exhibition at various Eastern fairs. In other respects the company are doing much to disseminate reliable information in regard to the attractions and natural resources of the country bordering on their road, with a view to its speedy settlement, and the investment of capital in the development of these resources. Circulars have been prepared containing valuable and interesting statistics, and various suggestions of use to settlers, or those who contemplate becoming such. The general range of prices of land in Iowa is from five to twenty-five dollars per acre, and in Nebraska, along the line of the road, from two to twenty dollars per acre, the average price of the company's farm-lands in the latter State being a little less than eight dollars an acre. Maps, circulars, and engravings, giving correct representations of the location of the lands and general features of the country, will be forwarded by mail, free of expense, to all applicants.

MR. WILLIAM PRESCOTT SMITH, Master of Transportation on the Baltimore and Ohio Railroad, died on the13th of October last. Mr. Smith was closely identified with the railway interests of the country, and more especially with those of the road of which he was the actual manager at the time of his death.

Car-Shop Notes.

THE TOLEDO, WABASH, AND WESTERN RAILROAD SHOPS, AT TOLEDO, OHIO.

THE main car-shops of this road are located at this place, about two miles from the Union depot, on a plot of ground well adapted to the purpose. The buildings are quite extensive, as they of necessity must be to keep up the repairs and supply new cars for this important and increasing line of road, the main line and branches making in the aggregate over one thousand miles, according to the last official report. The general plan of the shops is somewhat peculiar, or at least different from most of those we have heretofore noticed. The transfer-table will hold a passenger-car of the largest class. A space of 70 feet intervenes between this and the passenger-car erecting-shop. This shop has a capacity for setting up 16 cars at a time. Back of this are the wood and iron machine-rooms, in which is to be found the usual machinery for preparing car material, of which we would specially note an improved boring-machine, designed and patented by the master car-builder, Mr. Hoit. The improvement consists in the moving of the boring-head up and down, by means of gearing governed by a lever convenient to the operator. All the woodwork, as well as iron, is uniform and interchangeable, which obviates the laying of each piece, as patterns and templets are used entirely. All the freight-car flooring is dressed on a large No. 1 four-headed planer and matcher, and the four sides of a passenger-car sill can be dressed accurately on this machine at once.

On the opposite side of the transfer-table is another building, with five tracks on the ground floor. Three of these tracks are used for freight-car erection and repairs, and will accommodate eighteen cars at a time. The other two tracks afford room for eight passenger-cars, this part of the building being used as a paint-shop. On the second floor are the office, upholstery varnish, and store-rooms, all convenient and well adapted to their respective uses.

A room is specially devoted to the painting of head-linings, and is arranged and fitted up for that particular class of work, having numerous sky and side-lights. The linings painted here are worthy of commendation, from the fact that in every instance they appear to harmonize with the interior finish of the car, which is more than can be said of a great many head-linings, which present such discords of color as to give pain to a sensitive and discriminating observer. In many shops where room is not available, the canvas is put in its place in the car before being painted, which is a very good plan in one respect—a proper and natural reflection of light is obtained. But not one painter in ten will work upon canvas in that position if he can get at it in any other, for the obvious reason that it is extremely inconvenient and tiresome, if not positively painful. In some shops—this one included—a room is prepared expressly for this kind of work; but so far as we know, no attempt has been made to have the light reflected or thrown on the canvas, so as to produce an effect similar to what it does in a car when the canvas is in its proper place. The painter is, consequently, liable to be deceived as to the effect of his work, because he sees it in a wrong light. What is wanted are head-linings that will bear close inspection. This is the secret of all good work. The most expert and skillful artist can not turn out satisfactory work of this sort unless he avails himself of all favorable conditions and appliances. But it is not our intention at this time to tell "what we know about head-linings," and so we will return to the matter in hand.

The capacity of these shops is four freight-cars per day, exclusive of the usual passenger-work, which is no small item. At the time of our visit, a few weeks ago, there were in different stages of progress 6 coaches, 48 feet by 10, 4 through baggage-cars, and 4 combined baggage, mail, and express-cars. Within the past year, two first-class coaches, 54 feet long, have been built here, and as there are a few points in their construction that may be of interest to our readers, we will briefly refer to them. In trussing, the transom or bolster—oh! for a dictionary of terms!—instead of continuous rods running over the top of the two middle sills, a plate of boiler-iron, 14x28 inches, is placed on top of them, in each end of which are three ¾ holes, to which the truss-rods are secured with key-bolts, the rods running through to the end of the transom, as usual. This truss-plate is fastened with the usual centre-bearing bolts. Six longitudinal sills are used in the bottom framing. This, with the different modes of side-framing, gives great strength and stiffness, without an increase of weight. A cast-iron corner-plate is used to protect the corner-posts and the end of side sills. The corner of the canopy roof is a round casting, the wood being snugly inserted each way and fastened with screws. This is a manifest improvement upon the wooden corners. The exterior work is plain and substantial throughout. Short window-stools are used, which allows long panels between the windows, the intervening space being filled with two short ones. The window-openings exceed the usual length, being 23 inches wide and 38 long. The tops are oval. There are two sashes, the upper one shallow and stationary, affording more space when the lower sash is open. The interior of the car is elegant in design and workmanship, and compensates for any outside plainness. There are four saloons, two at each end. Two of these contain Dripp's patent heaters. The partitions dividing the saloons from the body of the car are on a line with the inside of the dome, and are made in such a way as to be mistaken by a careless observer for the ends of the car, there being nothing to indicate any saloons, except by close inspection. In place of the upper blind in the window-openings, plate-glass mirrors are substituted, their frames being elaborately carved and gilded, as are also the walnut mouldings above and between the windows, all in subordination to good taste, and not in such profusion and excess as to suggest the idea of gingerbread work or a doll-baby house. We think, however, that the number of mirrors at each end might be lessened to very good advantage, there being three, which is at least one too many. The inside wood-work is ash, trimmed and moulded with walnut. The finishing of these woods, particularly the ash, is very fine, and surpasses any thing of the kind we have seen.

The uniform truck for passenger-cars has six wheels, and differs from the ordinary truck only in the hanging of the spring-plank. Instead of being hung from the top of the cross-timbers, it is hung from the bottom, which gives less lateral motion to the bolster, and prevents the jar caused by its striking the wheel-timber—a much needed improvement, especially on roads with numerous short curves and fast trains. In addition to the ten 54-feet coaches we have described, the shops have also turned out five 48 feet long, with four-wheeled trucks.

The systematic management of these shops under the supervision of Mr. D. Hoit, the master car-builder, is deserving of special mention. Every department is so thoroughly organized, and all the operations are carried on with such regularity and precision, that it is only necessary to issue orders to the respective foremen to insure the turning out of any work with the utmost dispatch, without troubling the manager to look after details. Our acknowledgments are due to Mr. Hoit for attentions while visiting his shops, and for the information herein contained.

LAKE SHORE AND MICHIGAN SOUTHERN SHOPS AT CLEVELAND.

More than ordinary activity exists among the car-shops at this place, caused by the great increase of traffic on the numerous diverging roads during the past season, and a still greater prospective increase in the future. A large amount of work is constantly being done at the above-named shops. Four fine sleeping-coaches have been turned out recently, and two more are receiving their interior finishing in the paint-shop. They are 60 feet in length, and in other respects similar in design and construction to others of the same class that have been built here. It is sufficient to say that they sustain the established reputation of the shops of this road for turning out good work. A lot of caboose-cars are also in progress, and are built on the same plan as previous ones, which are noted for their comfort and convenience. A very large number of freight-cars are used on the road, and such is the activity of this branch of its business that a large gang of men are constantly engaged in repairing and renewing this class of rolling-stock.

CLEVELAND AND PITTSBURG RAILROAD SHOPS.

The increasing business of this road demands a more extensive equipment of cars, especially for passenger traffic. It has never had a sufficient surplus to take the place of disabled ones in the contingency of accident, a condition of things which received practical illustration a short time ago. Three coaches were loaned to another road, and were returned in the shape of kindling-wood, or nearly so, in consequence of a collision near Mansfield. Six new ones have been ordered to be built as soon as possible at the shops. They will be 52 feet long, which is ten feet longer than those built heretofore, and will in many respects be an improvement on those now on the road. A lot of 250 coal-cars will also be commenced immediately, and 30 box-cars to replace such as are worn out or destroyed. To do this work, the shops will be taxed to their full capacity.

Two first-class freight-engines, numbered 82 and 83, have recently been completed in the locomotive department. They are uniform in size and capacity with previous ones, and are beautiful specimens of the American 8-wheeled engine. Two more, designed for passenger service, are in progress, and will soon be ready for the track. The engines built at these shops in their general design and construction, economical running, strength, and beautiful finish, are surpassed by none on roads in this vicinity; indeed, it is safe to say they have not their equal among all the engines that run in and out of Cleveland daily on the various roads. This is saying a good deal, but it is a conceded fact. A new round-house is being erected on the opposite side of the main track from the old one, and will contain 20 stalls.

THE CLEVELAND BRIDGE AND CAR-WORKS.

The proprietors of these extensive works are Messrs. McNairy, Claflen & Company, who have an established reputation throughout the country for the superior quality of their work in bridge and car construction. Their freight-car department is fully occupied in the building of 500 cars for the United States Rolling Stock Company, a portion of which are broad gauge; and also 50 fruit-cars for the Merchants' Dispatch freight-line. A variety of work is under way in the street-car shop, including caboose, ore, hand, and street cars. Large numbers of the latter class are made at these works and shipped to all parts of the country. They are light and strong, and have the indispensable requisite of riding easy, an advantage which they possess over those made elsewhere. It is no uncommon thing for some of these cars to carry from ninety to a hundred passengers with room for more, the accommodations of course not being in all respects quite equal to those of a parlor coach.

The company have more bridge-work in hand than they ever had before at any one time, and it will be necessary to keep the machinery moving day and night the whole winter, in order to execute the contracts already booked.

THE railroad facilities of Iowa are in no way commensurate with the demands. They can not get the products away as fast as wanted. Every road in the State is crowded to its utmost capacity.

The National Car-Builder,

PUBLISHED MONTHLY,

BY

VOSE, DINSMORE & CO.,

1 Barclay Street, New-York; 52 Fifth Avenue, Chicago; 713 North Second Street, St. Louis.

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Editorial Announcements.

Correspondence.—*We cordially invite the coöperation of the railroad public in affording us the material for a good mechanical paper. Articles relating to rolling stock and machinery, by those practically acquainted with those subjects, will be gratefully received. All communications must be addressed to Vose, Dinsmore & Co., No.* 1 *Barclay Street.*

The name and address of the writer must accompany all communications designed for publication.

Advertising Rates.—*For one square, or one fifth of a column,* $5 *per month, or* $50 *a year. For half a square,* $3 *per month, or* $25 *a year. Larger advertisements by special contract.*

All communications in regard to advertising should be addressed to L. F. Dinsmore, *Post-Office Box* 4055, *New-York City, who is our agent for advertising, and authorized to make contracts, collections, etc.*

Engravings and Illustrations.

We would invite the attention of Master Car-Builders and others to the advantages to be derived from publishing in The National Car-Builder *engravings designed to illustrate the various features and details of car construction, and especially such improvements as can not otherwise be clearly presented. We will procure cuts to be made in the best manner from drawings or models that may be sent us, and charge only for the cost of engraving, inserting the same in our paper with suitable descriptive details, without charge.*

Railroad Accidents.

We have, according to reliable estimates, 60,000 miles of railway in operation, covering the area of a continent, and if placed in a direct and continuous line, would reach two and a half times round the earth, or one quarter of the distance to the moon. It is also estimated that the aggregate number of passengers carried is nearly one hundred millions annually, to say nothing of a freight traffic of corresponding magnitude. That this prodigious activity and movement, carried on by the agency of powerful mechanical forces, should be liable to occasional mishaps resulting in injury to persons and loss of life, would seem to be a matter of course. We are too much occupied in projecting and building new roads, and in operating to the best advantage those already built, to take any precautions against accidents that necessarily involve large expenditure. Our roads are therefore, almost without exception, open highways, with grade crossings everywhere, even in large and populous towns. It is then by no means surprising that within a period of eight months, from February to September inclusive, of the present year, the record shows that 295 train-accidents have occurred on our railways, causing the death of 177 and the injury of 579 persons. These numbers are of course not strictly accurate, being under rather than over the mark, but are nevertheless a fair approximation. The number of casualties, it must be confessed, is small indeed, when contrasted with the total mileage of roads operated, and the aggregate of passengers carried, even if we add the accidents from individual carelessness not properly, classified with the above. Small as the catalogue is comparatively, it might by more thorough and efficient management be made still smaller. So far as ascertained, a large proportion of the whole number occurring within the period named, was from rear and head collisions, the next largest was caused by cattle obstructions, and the next by misplaced switches. Assuming this exhibit to be substantially correct, it is easy to see that the real source and primary cause is justly traceable to bad management. To say that an accident was caused by a collision or misplaced switch, is tantamount to saying that the death of a person was caused by his inability to breathe—a verdict that would hardly be creditable to a coroner's jury of ordinary mental caliber. What the public want to know in every such case, is the primary and not the secondary cause. Collisions could never occur, either on a double or single track, if the proper precautions are taken to prevent them. The use of a road-telegraph in connection with a well-arranged system of signals, and a strict adherence, by faithful, capable, and vigilant employees, to such prescribed regulations as should be, but are not always to be, found on our roads, would not only prevent collisions but numerous other mishaps. Misplaced switches, as every one knows, figure largely among the causes of accidents; but in every such instance, it is very plain that the real cause lies behind the switch, and is to be found in incompetency, or niggardly and reckless management proceeding from head-quarters. The principal is in law responsible for the acts of his agent, and railroad management should be amenable to the same code when such agent is unfit to perform the duties assigned him, especially as such duties involve the personal safety of passengers who are, by an implied contract with the railway corporation, entitled to safe transit. This principle is recognized and practically applied in numerous cases by courts and juries in adjudicating claims for damages against railways, resulting from train accidents.

There is, of course, a class of accidents that are unavoidable, resulting from causes which can not in the nature of the case be foreseen, such as defective material, and the sudden fracture of a rail, axle, or wheel where no visible flaw existed to indicate danger. But these cases are exceptional and comparatively few. There is still another class that could be avoided, but will not be, at least for many years to come. We allude to such as are caused by grade crossings and cattle. We can not afford just at present to fence up 60,000 miles of track, and substitute bridges and tunnels for existing methods; so we must continue to blow the whistle, and put up sign-boards warning people to "look out for the locomotive when the bell rings."

Preliminary Work.

We beg to call the attention of master car-builders, and others connected with the mechanical departments of railroads, to the series of interrogatories which we print in another column, designed to elicit information upon sundry specified topics pertaining to the construction of passenger and freight-cars. These interrogatories have been framed and sent in the form of circulars to the members of the Master Car-builders' Association, and foremen of car-shops, with the expectation that replies will be made to each, and forwarded to the chairmen of the respective committees in time to be presented to the next annual meeting in the form of reports.

It is hardly necessary for us to dwell upon the importance of the information sought to be obtained, as this must be manifest to every member of the association; nor need we mention the obligation which each and every member is under to contribute his proper quota toward furnishing what the interests of the association so imperatively need. The official report of the proceedings of the last annual meeting is by this time in the hands of all the members, and those who have carefully read it, can not have failed to note the absence of any thing like full and elaborate reports of committees upon many topics which the collective body had assembled to discuss and act upon. Suggestions and verbal reports were made upon various subjects, but as nothing sufficiently matured and tangible for definite action was presented, many important matters were necessarily deferred to a future meeting. There was a manifest lack of preliminary work on the part of committees in the way of collecting information upon the special subjects assigned to them, and presenting the same in such form as to be acted upon or to go upon the record for future reference.

The usefulness of a body organized to promote the interests of any special branch of industry, depends in the very nature of the case, upon the earnest efforts of each individual member. If the preparatory work is not attended to, the body, when assembled, can do little else than appoint new committees or continue the old ones. This was done by the association at its last meeting, and when it again assembles, it will find itself laboring under the same embarrassment, unless the committees in the mean time perform their several duties, and these duties can not be well performed without the earnest aid and coöperation of every member. A great deal of effective work can be done during the interval of seven months which intervenes between now and the second Wednesday of June. There is ample time for investigation and inquiry for the purpose of forming settled opinions on the various subjects that will come up for future discussion. Every one who fills a position of responsibility in a car-shop is presumed to have some definite views in regard to every important detail of construction, and especially such as involve points which are more or less subjects of controversy, or, to say the least, differences of opinion. As an illustration, we need only mention the two familiar topics of heating and ventilation, which just now, as the winter is setting in, claim special attention.

We say, then, there is no sufficient reason why full, elaborate, and well-considered reports should not be presented to the next annual meeting upon each of the subjects now in charge of the several committees, and it is to be hoped that the preliminary work will be begun at once, by preparing replies to each of the interrogatories referred to, and forwarding the same to the chairmen of committees in time to have them embodied in their respective reports to the next convention.

"The Dinsmore" Spring.

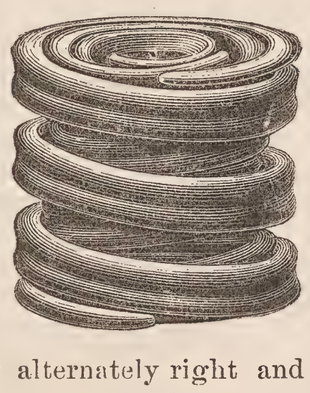
The advantages of a proper application and use of springs in the management of every class of railway rolling stock, are obvious to all who are familiar with the details of railway operation. The increased size and weight of both passenger and freight-cars render it necessary, as a matter of economy, that every point of contact should be protected to prevent the wear and tear of violent collision. A hard-riding car is a constant source of unnecessary expense, causing discomfort to passengers and more or less injury to many kinds of freight. It wears itself out faster, and also wears the rail and track. A car of this kind may be, and often is, equipped with good and serviceable springs but owing to the fact that they are not adapted to the car, the result is detrimental to both. The vehicle suffers from jarring and pounding, if the springs are too rigid, or from an excessive rocking and swaying, if there is too much action and elasticity; and the springs themselves are worn out before their time, or perhaps discredited and rejected for no inherent fault, but only because they had been misapplied. This mistake is often made by managers of rolling stock. Springs are placed in a position where their proper functions can not be performed without becoming mechanically disorganized, and cars get banged and pounded to pieces, little by little, because they are not properly supported.

The essential qualities of any spring designed for railway use, are durability, power, and elasticity, and in its practical working these elements must be combined so as to be, as it were, necessary counterparts of each other, the spring serving as a cushion interposed between opposing forces to prevent violent contact.

Its office is to do this with no loss of power or ability to react under continuous pressure. The sustaining capacity of a spring, or a certain number of them as applied to a car and forming a "set," should be fairly adequate to support the weight without useless waste or surplus of power, and their elasticity or capacity of yielding should be just enough to give the car an easy carriage without unnecessary rocking or swaying. The application of springs, so as to meet these requirements is not a difficult matter, provided there is careful preliminary testing, aided by good mechanical judgment. Every experienced rider knows there is a great difference in the motion of cars belonging to the same train, and he soon selects the one which suits him best. This difference is almost always owing to the character of the springs.

A glance at the trucks of passenger or freight-trains on any line of road, shows what a variety of springs there are in use. Rubber is a favorite with many, and if made of fine gum combined with the other necessary ingredients to give it body and tenacity, it makes a good and serviceable spring. It is an expensive spring if well made, and still more expensive if poorly made, no matter how low comparatively the price may be.

Without enumerating the various kinds which are or have been in use, we desire to call the attention of railway managers more particularly to the *Dinsmore* spring, as being better adapted to passenger and freight work than any other spring made exclusively of steel. It is now rendering such good service on so many roads, and its peculiar structure is so well known, that we hardly need to describe it in detail. The cut which we insert will convey a very correct idea of its general form and construction. It is particularly serviceable as a bearing spring for all classes of cars, and it is also very extensively used as a buffer. It consists of three or more spiral coils placed one within the other and forming a nest, the coils being alternately right and left. This arrangement secures a combined and uniform action of the several coils, each being kept in its place and performing its proper function independently of the others so far as sustaining the load is concerned. There is a clear space between the several coils, so that all friction from their contact is avoided. By increasing or diminishing the number and size of coils in a nest, the power and capacity of the spring can be varied to suit any service required, and when properly fitted to its place in the truck, will last an indefinite time, the liability to breakage being very small indeed so long as it has fair usage. It combines all the requisites we have named, durability, power, and elasticity, and is in all respects a spring that is destined to meet with increasing favor the more it is used.



Chicago.

ONE year ago, we predicted in these columns that Chicago would, in twelve months, be fairly on her feet again, and that the force and power of reaction would correspond with the shock of the overwhelming disaster. Our prediction is more than fulfilled. The reconstruction of the ruined city has progressed at a marvelous rate. Such a wonderful and rapid recuperation has no precedent in history. It attests the enterprise and pluck which have always been the acknowledged characteristics of the metropolis of the North-west. It is stated that since the middle of April up to the end of December of the present year, if the work of rebuilding goes on at the same rate as heretofore, there will then have been completed one brick, stone, or iron building, 25 feet front, and from four to six stories high, for each working hour of each working day of that time, exclusive of the many new buildings erected outside of the burnt district. The new structures are, as a class, greatly superior to the old ones, and will give to the city a more beautiful and imposing appearance. It is safe to predict that the second anniversary of the fire will find its ravages almost if not entirely obliterated, and the risen Phœnix, resplendent with massive blocks of stately architecture, its waste places built up, and resounding with the clang and clatter of a growing and flourishing trade, will exultingly challenge the admiration of the world. Ten years would not be too long a time for repairing such a disaster, judging from the ordinary course of things; but Chicago is an admitted exception, the entire growth of the city from the original prairie being a marvel and wonder to all mankind. Ten years hence, it will no doubt be quite apparent that the great fire was a positive advantage, instead of a drawback, to the city's growth and prosperity.

Height of Draw-Heads.

AN error occurred in publishing the report of the fifth annual convention of master car-builders, held at Richmond, with reference to the standard height of draw-bars, which was fixed 2 feet 9 inches. Those who have the report will please note the following correction, which has been issued by the secretary in a slip attached to the last, or sixth annual report, in the form of an erratum:

"On page 46 of fifth annual report, 16th line from top, for 'Mr. Myers's amendment,' read *Mr. Ford's amendment:* by which it will be seen that the standard height of draw-heads from top of rail to centre of draw-head, for passenger and freight-cars, is 2 feet 9 inches."

Miscellaneous Items.

THE Chicago and Alton Railroad Company have just completed, and are now running as day express on their road, one of the most complete trains in the world. It consists of a baggage and mail-car, four coaches, and a palace dining-car. It is equipped with Thornton's spark-arrester and patent dust-shield, Goodale's steam-brake, Creamer's safety-brake, Blackstone's patent platform and coupler, and Reniff & Buttolph's ventilators. The managers announce that the whole road will shortly be equipped in the same way.

BY the end of the present season the Chicago and Alton Railroad Company will have one fourth of its road laid with steel, and it has contracted for enough to lay another quarter of the road by the end of the next season.

THE Louisville and Nashville Railway Company is building at Nashville a blacksmith shop 200 x 170 feet, for the accommodation of steam-hammers and 36 fires and furnaces. The company are crowded with work in all departments. Five new passenger coaches, finished in the finest style, have been recently placed upon the road; ten more are nearly completed, while the foundations for ten others have been laid. Two new 10-wheel locomotives and one 8-wheel, built by it, are also ready for the road.

IN many places in England they have for several years been using a safety-valve for steam-boilers that appears to be an absolute safeguard against explosions from low-water. The valve is entirely within a certain point, the valve opens and a jet of steam is discharged upon the fires, the valve closing again when the water in the boiler is restored to its proper level. Being beyond the reach, the valve can not be tampered with, and, having its working parts above high-water level in the boiler, it is not liable to get out of order from corrosion.

THE Painesville, Youngstown, and Pittsburg narrow-gauge railroad is being pushed forward with commendable energy, and the president, Mr. Paul Wick, states that cars will be running between Warren and Youngstown by the 1st of January. This road will add greatly to the prosperity of the already prosperous Mahoning Valley, by causing a still greater development of that rich mineral and agricultural region.

THE Columbus Car and Car-Wheel Works, at Columbus, Ohio, employ a force of nearly 400 men. The buildings are of brick and stone, and comprise a foun, dry 190x90; machine-shop, 150x50; forge-shop, 100x65, (20 furnaces;) wood machine-shop, 200x40; erecting-shop, 175x80; paint-shop, 136x50; dry-house, pattern-shop, pattern, storage, and store-house. When operated at their full capacity, the works turn out ten gondola coal-cars per day, and a proportionate number of box-cars. A vast number of chilled car-wheels, in excess of those made to equip the new cars here constructed, are cast for the Pittsburg, Cincinnati, and St. Louis Railroad Company. Mr. John L. Gill, the sole proprietor, is provided with all the modern improvements in machinery that a long familiarity with the business could suggest. During the year 1871 7000 tons of pig-metal and 1800 tons of wrought-iron were consumed, and the business of the works amounted to nearly one million dollars. This year it will reach nearly if not quite a million and a half. Mr. E. P. Bullard, a man of remarkable mechanical ability and energy, is the general superintendent.

THE Chicago and Northwestern Railroad Company are about to commence the erection of extensive new machine-shops at a point just west of the city limits of Chicago, and adjacent to their line of road, on what is now a broad unoccupied prairie. The construction of these shops will be a great advantage to the locality, and will add another important suburb to the city within the next two years.

THE Pullman Car Company, at their works in Detroit, are erecting brick buildings in place of the former wooden ones. They now have fifteen new cars in the shops, and three undergoing repairs.

THE Michigan Central Railroad Company are preparing plans for the erection of new car-shops at Grand Trunk Junction, near Detroit. The paint-shop will be over 700 feet in length. The setting-up shop will be in the form of a half-circle, and will contain 22 tracks and accommodate 44 freight-cars at once. The company own ninety acres of land at the locality referred to. The same company are also erecting extensive machine-shops at Jackson, Michigan.

A LARGE force of workmen are at present employed in laying a third track for the Pennsylvania Railroad along the line between Altoona and Cresson. The track will be constructed along the entire line from this city to Philadelphia as rapidly as possible.

THE increased passenger business of the Peoria and Rock Island Railway has necessitated the buying of several handsome new passenger-coaches. Westinghouse's air-brakes are used by this road on all passenger trains, and every attention paid the traveler to secure his comfort and safety.

THE Fremont Car-Works at Fremont, Ohio, will be completed by next April. Their general plan is similar to that of the Buffalo Car-Works, but on a smaller scale. The buildings are brick, except the foundry, which is stone, and all have slate roofs. The erecting-shop is 70 feet long, and the wood-cutting shop 128 feet; the machine-shop 83x80; the storage-room 36x40, and the engine-room, 36x26. The capital of the company is $200,000.

MR. M. E. BROWN, formerly master-mechanic of the Buffalo and Rochester division of the Erie Railway, has been appointed superintendent of rolling stock of the entire road and branches. Mr. J. G. Hubbard, formerly general foreman of the Erie shops at Buffalo, has been appointed master-mechanic of the Buffalo and Rochester division and branches. Mr. Brown's office is in New-York, and Mr. Hubbard's in Buffalo.

NEW-HAVEN, CT., is to have a splendid new railroad depot 600 feet long, with spacions platforms and elegantly fitted waiting-rooms and offices.

Mr. Benjamin Briscoe has resigned the position of master-mechanic of the Detroit and Milwaukee Railroad, and has been succeeded by Mr. Andrew Wilson, who resigned a similar position on the Jackson, Lansing, and Saginaw road.

Mr. H. M. Smith, for years past master of machinery of the Alabama and Chattanooga Railroad, has accepted a position as master-mechanic of the Evansville, Henderson, and Nashville Division of the St. Louis and South-eastern Railway, having his headquarters at Nashville.

Mr. John T. Wilson has been appointed master-mechanic of the Southern Pacific Railroad of California. Mr. Wilson has been in railroad service, as engineman, foreman, or master-mechanic, since 1852. In 1862 and '63, he was master-mechanic of the Clinton shops of the Chicago and North-western; master-mechanic of the Utah Division of the Union Pacific in 1869 and '70; and afterward of the Humboldt Division of the Central Pacific, whence he goes to the Southern Pacific.

T. A. Bissell, for fourteen years connected with the Chicago, Burlington, and Quincy Railroad as draftsman, has been appointed superintendent of the Pullman car-shops in Detroit, under C. F. Allen, general manager of shops for the Pullman Company, who was himself long engaged in the Chicago, Burlington, and Quincy shops at Aurora.

Mr. George Stevens, master-mechanic of the Houston and Texas Central Railroad, and formerly master-mechanic of the Boston, Concord, and Montreal Railroad, died last week at Houston, Texas.

Mr. E. P. Hill, formerly of Dunkirk, New-York, has been appointed assistant superintendent of rolling-stock of the Erie Railway.

New Publications.

The Coal and Iron Record is a valuable weekly journal of sixteen pages, published by Western & Co., 37 Park Row, New-York, and specially devoted to the interests indicated by its name. It contains a variety of original and selected matter, full and reliable market reports, valuable statistics, illustrations of new machinery and improvements, and special contributions from well-known scientific men, making it in all respects a publication indispensable to all who are interested in the important products of coal and iron, either as dealers or consumers. Price, $3 per volume—two volumes a year.

Gear's Illustrated Mechanical Advocate is a neatly printed monthly journal of eight pages, published in Boston by A. S. & J. Gear & Co. It is specially devoted to iron and wood-working machinery, and besides being illustrated with numerous engravings and descriptive articles of new and improved mechanism, it contains much discriminating and reliable criticism of special value to purchasers, and based on a practical knowledge of this class of machinery and the wants of the trade. Price, $1 per year.

The Iron World and Manufacturer, of Pittsburg, Pa., is published weekly, and as an organ of the metal trade is worthy of wide recognition and liberal support. It is now in its fifth volume, and contains forty columns, being the largest metal price-current in the world. Its editorials and original contributions display ability and enterprise, and a thorough appreciation of the wants, growth, and magnitude of the metal trade in its various departments. No one engaged in any branch of the trade should be without it. Price, $4 per year.

The Chicago Railway Review gives evidence of many improvements during the past year. In addition to its usual full and interesting discussions of railway topics, it contains a well-digested summary of railway news from all quarters, and much valuable information upon subjects connected with practical engineering. It also devotes a large space to the narrow-gauge problem, and maintains its opinions upon this controverted subject with earnestness and ability.

The Hub sustains its enviable reputation as a model journal of its class, each number being the equal, if not an improvement upon its predecessor, in the matter of elegant typography, and original and selected articles of special interest to the trade of which it is the recognized organ.

The Penn Monthly, of Philadelphia, discusses questions of public interest in politics, social improvement, science, art, philosophy, and education, in a manner worthy of the attention of thoughtful minds who desire something more than a superficial knowledge of this class of topics.

Publisher's Notices.

Fancy Woods and Veneers.—We desire to call the attention of car-builders and others to the advertisement, on fourth page of cover, of Messrs. Cole & Comstock, manufacturers and dealers in veneers and fancy woods, and who rank among the old and long established houses in this line, the senior partner being the inventor of the first veneer-cutting machine, on the draw-cut principle, used in this country. Their sales-room and factory, heretofore located in Chrystie street, were burned a few weeks ago, and much valuable stock destroyed, since which they have removed their business to 199 and 201 Centre street, adjoining Earle's Hotel. Their present stock consists of a well-selected assortment of foreign and domestic veneers, including rosewood, mahogany, French and American walnut, blister and bird's-eye maple, Hungarian ash, black-walnut and ash burls, etc.; also a choice variety of cabinet woods for car-manufacturing purposes.

Varnishes and Fine Colors.—Messrs. Charles F. Hollwede & Co., 110 Chambers street, dealers in coach and car-painters' materials, are supplying the trade with the celebrated Isola Bella Coach Varnish, of which their establishment is the sole depot. This varnish is manufactured by a new and entirely different method from that of other American varnishes, and in brilliancy of gloss, and every other essential quality, is not surpassed by any in use. In elasticity and durability it is fully equal to the English, while it dries in four days without having any more tack to it, and is sold at a less price. Its use is sure to destroy the prevailing prejudice against our home-made varnishes, as it is just as good, if not better, than any that is imported.

French Walnut Veneers.—Mr. L. Hirsch, 175 Canal street, makes the importation of this style of veneering a specialty, and has in stock a large and desirable lot suited to the wants of the trade. He has also a fine assortment of inlaid border patterns, embracing forty different varieties of elegant designs, suited to the finishing of palace-cars; also some beautiful specimens of marqueterie work of various sizes and patterns for table-covers and other ornamental purposes. See advertisement on fourth page of cover.

Mineral Sperm Oil.—This article, manufactured at the Corry Kerosene Oil-Works, under the auspices of Williams, Page & Co., of Boston, is said to be the only illuminator for cars that can guarantee comfort and safety to the traveler. Its excellent qualities have been demonstrated by various experiments, and it is now used by the Pullman Palace Car Company and several leading roads East and West. The above-named firm also manufacture car-lamps suited for using the mineral sperm.

A Titusville wife placed a toy snake in her husband's boot the other morning, and then could hardly get breakfast because of her snickering at his performances when he discovered it. He first looked in the mirror, then went and threw his demijohn of old rye into the mill-race. He drank thirteen cups of coffee at breakfast, and for several evenings afterward astonished his children by going to bed at nine o'clock.

As the early morning train down on yesterday drew up at the principal suburban station, a pleasant looking gentleman stepped out on the platform, and, inhaling the fresh air, enthusiastically observed to the brakeman, "Isn't this invigorating?" "No, sir, it is Bethel," said the conscientious employee. The pleasant-looking gentleman retired.

A California man has invented a patent egg-hatcher, and the old hens down that way are organizing a movement to bust up his business. They swear they will kill off all the roosters and quit laying eggs.

THE BUFFALO CAR COMPANY,

BUFFALO, N. Y.,

ARE NOW PREPARED TO RECEIVE ORDERS FOR ALL KINDS OF

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These works, recently completed, are furnished with the very latest and best Machinery, and are prepared to furnish the better qualities of work with promptness.

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Views of Buildings, Machinery, Landscapes, and Book Illustrations, at reasonable rates.

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OF EVERY DESCRIPTION.

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For Car Seats, Mattresses, and Pillows.

Erie and Atlantic Sleeping Coach Co.,
General Offices, 309 West 23d Street,
New-York, March 26, 1872.

F. W. Bloodgood, Esq., *President Patent Elastic Felt Co. P. O. Box 129, Jersey City, N. J.:*

Dear Sir: Press of business and absence from the city has prevented me from saying to you earlier, that our experiment the past year, in using your Patent Elastic Felt for Pillows and Mattresses, in the coaches of this Company, has proved entirely satisfactory, and that I now regard it as decidedly preferable to hair and feathers. It does not pack like hair, is soft, durable, and withal cheaper. Respectfully yours,
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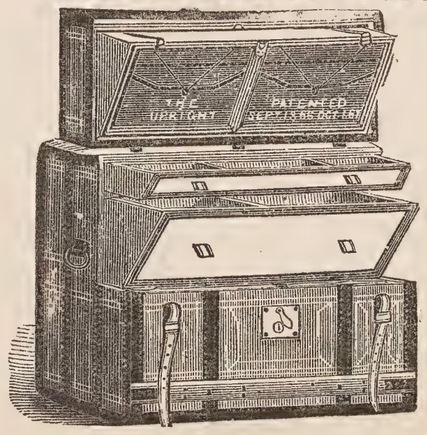

Opens without removing from the wall.

Instead of trays to lift out, it is arranged with drawers.

It is stronger, as only a small portion opens, whereas in the old style the whole top comes off.

Same room in bottom of the trunk for dresses as in the old style.

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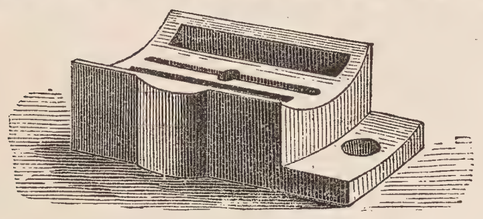

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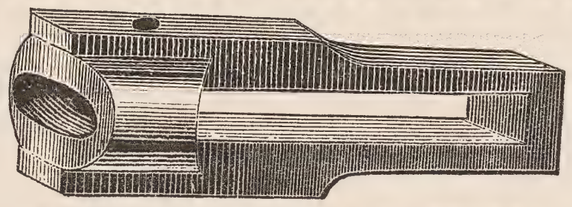

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The head is welded to the bar instead of rivetting, which makes it more durable and stronger, and a great saving to any Railroad Company in repairing drawheads, as not one of our plan will be broken where fifty of the ordinary kind will fail. Any wrought-iron bar that can be repaired at all, can be changed to the Ross & Arthur Patent. and at a cost as low as to repair the old style of bar. Rights for sale to car manufacturers and railroad companies. For further particulars address the Patentees, ALEX. ROSS & JOHN ARTHUR, Freeport, Ill., P. O. Box 590; or, VOSE, DINSMORE & CO., No. 1 Barclay Street, New-York City.

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B

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C

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D

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E

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East-Tennessee & Georgia	Eli Hixon		Knoxville, Tenn.
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F

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G

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H

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I

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South ivision	David Oxley		Centralia. Ill.
North Division	J. B Edams		Amboy, Ill
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J

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K

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L

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Little Miami	J. H. Setchel.		Cincinnati, Ohio.
London & Port Stanley			London, C. W.
Louisville, New-Albany & Chicago	Jacob Losey	Jacob Losey	New-Albany, Ind.
Long Island	Chs. A. Thompson		Hunter's Point, L I.
Louisville, Cincinnati & Lexington	John Skidmore	S. S. Pilson	Louisville, Ky.
Louisville & Nashville	†Thatcher Perkins		Louisville Ky.
Louisville & Nashville	Jas. Montgomery		Bowling Green, Ky.
Louisville & Nashville		Isaac Owens	Louisville, Ky.
Louisville & Nashville	Tho. Welsh		Memphis, Tenn.
Louisville & Nashville	Richard Dolby		Edgefield, Tenn.
Louisville & Nashville	Wm. Russell		Decatur, Ala.
Louisville & Nashville	D. P. Rennie		Birmingham, Ala.
Nashville & Decatur Division	C. D. Knowles		Nashville, Tenn.
Lake Shore & Michigan Southern	*James Sedgley	‡John Kirby	Cleveland, Ohio.
Michigan Southern Division	William Hill		Elkhart, Ind.
" " "		S. S. Knapp.	Adrian, Mich.
Toledo Division	Geo. H. Tier	Frank O. Bray	Norwalk. Ohio.
Erie Division	L. O. Gassett	J. Withyecombe.	Cleveland Ohio.
Buffalo Division	B. H. Kidder	A. Robson	Buffalo, N. Y.

M

Marquette & Ontonagon	A. P. Burroughs	H. D. Lyons	Marquette, Mich.
Macon & Augusta			Macon, Ga.
Maine Central	J. W. Philbrick	J. W. Philbrick	Waterville, Me.
Macon & Western	D. M. Gogul	James A. Knight	Macon, Ga
Manchester & Lawrence	Chas. L. Eastman	M. W. Dickerman	Concord, N. H.
Macon & Brunswick	M. Thornton	M Thornton	Macon, Ga.
Maysville & Lexington			Maysville, Ky.
Marietta & Cincinnati	E. Bosley	E. Bosley	Chillicothe, Ohio.
Memphis & Little Rock	N. Greener	C. W. Wooldridge	Huntsville. Ark.
Memphis & Charleston	Michael Burk	A. W. Drew	Memphis, Tenn.

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‡ General Master-Mechanic.
† Master of Machinery.
§ Gen. Master Car-Builder.
General Foreman.

* General Master-Mechanic.
† Mechanical Superintendent.
‡ General Master Car-Builder.

Railroad.	*Master-Mechanic.*	*Master Car-Builder.*	*Residence.*
Memphis & Charleston	H. N. Burford	Fabien Varin	Huntsville, Ala.
Mineral Point	Robert Hay		Mineral Point, Wis.
Mississippi & Tennessee	James Eblen	James Eblen	Memphis, Tenn.
Mississippi Central	Henry Gibbon	John E. Becton	Water Valley. Miss
Maryland & Delaware	Samuel Peters		Greensboro, Md.
Mississippi, Gains. & Tus			Gainsville, Ala.
Midland Pacific			Nebraska City, Neb.
Milwaukee & St. Paul	T. S. Davis	Wm. E. Kettridge	Milwaukee, Wis.
Milwaukee & St. Paul		John Baillie	Milwaukee, Wis.
Milwaukee & St. Paul	J. Pattee	D. F. Wilson	Minneapolis, Minn.
Hastings & Dakota Division	C. C. Clements		Hastings, Minn.
Michigan Central	A. S. Sweet, Jr	J. B. Sutherland	Detroit, Mich.
Grand River Valley Division		James Potts	Jackson, Mich.
J'kson, Lans'g & Saginaw Div	Andrew Wilson	Andrew Wilson	Jackson Mich.
Montgomery & West-Point	J. McVey	W. H Daniels	Montgomery, Ala.
Montgomery & Eufaula	James McCann	I. E. Holmes	Montgomery, Ala.
Mobile & Montgomery	James McFarland	L. Barham	Montgomery, Ala.
Mobile & Girard	William Eyles	A. J. Nix	Girard, Ala.
Mobile & Ohio	L. J. Fleming / B. S. Skates	John McHugh / B. S. Skates	Mobile, Ala. / Whistler, Ala.
Missouri River, Fort Scott & Gulf	John S. McCrum		Kansas City, Mo.
Missouri River, Fort Scott & Gulf		Josiah Stahl	Wyandotte, Kan.
Missouri, Kansas & Texas	C. T. McIlvaney	J. Townsend	Sedalia, Mo.
N			
Nashville & Chattanooga	John U. Eastman	J. G. Sawyer	Nashville, Tenn.
Nashville & Decatur	C. B. Knowles	C. B. Knowles	Nashville, Tenn.
New-Bedford & Taunton	Robert Chase	Robert Chase	New-Bedford, Mass.
New-Canaan			New-Canaan, Ct.
New Brunswick & Canada	T. Armstrong	T. Armstrong	S'nt Andrew's N.B
New-Haven & Northampton	Henry Fox	Henry Fox	New-Haven, Ct.
New-York & Harlem	Wm. M. Strong	Leander Garey	New-York.
New-York Central & Hudson River	G. B. Van Vorst		Albany, N. Y.
New-York Central & Hudson River	Henry Watkeys		Syracuse, N. Y.
New-York Central & Hudson River	Amos Gould		Rochester, N. Y.
New-York Central & Hudson River		Wm. Johnson	Buffalo, N. Y.
New-York Central & Hudson River	Wm. Buchanan	John McKenna	New-York.
New-York Central & Hudson River	John Dikeman		East-Albany, N. Y.
New-York Central & Hudson River		Joseph Jones	West-Albany, N. Y.
New-York Central & Hudson River		George Rowe	Niagara Falls, N.Y.
New-York, Boston & Montreal	S. W. Tozer	S. W. Tozer	E. Tarrytown, N.Y.
New-York & Oswego Midland	Wm. H. Griggs	Wm. H. Griggs	Oswego, N. Y.
New-York, Providence & Boston	Jas. H. Anderson	Jas. H. Anderson	Providence, R. I.
New-York & New-Haven	H. Kittendorf	M. C. Andrews	New-Haven, Ct.
New-London Northern	J. W. Dow	S. W. Caulkins	New-London, Ct.
New-Jersey Midland	J. E. Wiggins	J. E. Wiggins	Godwinsville, N. J.
New-Jersey Southern	Rufus Blodgett		Manchester, N. J.
New-Haven & Derby			New-Haven, Ct.
New-Orleans, Opelousas & Gt. Western	John McCluskey	Matthew Nolan	Algiers, La.
New-Lisbon			Leetonia, Ohio.
New-Orleans & Ohio	John R. Jordan	John R. Jordan	Paducah, Ky.
New-Orleans, Jackson & Gt. Northern	John Conlon	Charles Bartine	New-Orleans, La.
New-Haven, Hartford & Springfield			Hartford, Ct.
Naugatuck		George W. Gray	Bridgeport, Ct.
Newark & Bloomfield	Luke F. Tronson		Hoboken, N. J.
Nova Scotia	W. Johnson		Bedford, N. S.
North-Carolina	Rufus D. Wade	B. G. Sergeant	Co. Shops, N. C.
New Orleans, Mobile & Texas	Josiah Bettis	W. H. Johnson	Mobile, Ala.
Northern Central	C. M. Lewis		Baltimore, Md.
Northern Central		G. W. Demarest	York, Pa.
North-Lebanon		Henry B. Oves	Lebanon, Pa.
North-Pennsylvania	Franklin Roop	Franklin Roop	Philadelphia, Pa.
North Eastern	D. W. Haines	A. M. Corrie	Florence, S. C.
Northern	James W. Lander	Albert Langmaid	Concord, N. H.
Northern of New-Jersey	T. W. Demorest		New-York.
Norwich & Worcester	Richard Colburn	G. R. Bentley	Norwich, Ct.
Northern of Canada	P. Clark.	P. Clark	Toronto, Can.
Northern Pacific	†Geo. W. Cushing		St. Paul, Minn.
O			
Ogdensburg & Lake Champlain	William A. Short	J. R. Ames	Malone, N. Y.
Old Colony & Newport	J. K. Taylor	A. Gleason	Boston, Mass.
Orange, Alexandria & Manassas	James E. Waddey	John T. Nalls	Alexandria, Va.
Oil City & Pithole	George Thompson		Pithole, Pa.
Oil Creek & Alleghany River	J. S. McElroy	Jacob Williams	Corry, Pa.
Oil Creek & Alleghany	H.J.Bookhammer.	John Monks	Oil City, Pa.
Ohio & Mississippi		M. Contant	Cochran, Ind.
East Division	A. Thompson		Cochran, Ind.
West Division	H. Elliott	E. Martin	East St. Louis, Ill.
P			
Panama	Chas. E. Stewart	J. G. Wilson	Aspinwall, N. G.
Pacific of Missouri	†John Hewitt	John Hewitt	St Louis, Mo.
Pennsylvania	†G. C. Gardner		Altoona, Pa.
Pennsylvania	H. D. Garrett	I. W. Van Houten.	W. Philadelphia, Pa.
Pennsylvania	E. L. Caum	Samuel W. Myers.	Harrisburg, Pa.
Pennsylvania	G. W. Strattan	John P. Levan	Altoona, Pa.
Pennsylvania	D. O. Shaver	R. S. Ramsey	Pittsburg, Pa.
New-Jersey Division	John Headden	David H. Baker	Jersey City, N.
Philadelphia & Erie	Martin Walls / W. L. Foster / W. L. Holman / W. T. Smith.	George J. Mason. / Robt. M.Messimer. / Wm. P. Newcomb. / David Cowley	Sunbury. Pa. / Renovo, Pa. / Kane, Pa. / Erie, Pa.
Philadelphia, Wilmington & Baltimore	S. A. Hodgman	George W. Perry.	Wilmington, Del.
Philadelphia & Reading	L. B. Paxson	Aaron Steinbach.	Reading, Pa.
Philadelphia, Germ'n & Norris'n	John Moyer	Nathan Pawling.	Philadelphia, Pa.
Philadelphia & Baltimore Central	S. D. Danfield	SamuelD.Danfield.	Chester, Pa.
Pittsburgh, Cincinnati & St. Louis			
Pittsburgh & Columbus Division	E. Pierce		Dennison, Ohio.
Pittsburgh & Columbus Division		James McGee	Steubenville, Ohio.
Little Miami Division		M. P. Ford	Columbus, Ohio.
Little Miami Division	J. H. Setchel		Pendleton, Ohio.
Col., Cin. & Ind. Division	Robert Curtis	Tho. Chamberlain.	Columbus, Ohio.
Col., Cin. & Ind. Division	W. H. Purdy	W. H. Purdy	Logansport, Ind.
Peoria & Rock Island	Theo. Mosher		Peoria, Ill.

* Mechanical Superintendent. † Superintendent of Motive Power and Machinery.

Railroad.	*Master-Mechanic.*	*Master Car-Builder.*	*Residence.*
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Pittsburg, Fort Wayne & Chicago	J. M. Boon.		Fort Wayne, Ind.
Pittsburg, Fort Wayne & Chicago		J. J. Kirkland	Crestline, Ohio.
Pittsburg Washington & Baltimore	W. H. Harrison	J. M. Rutter	Connellsville, Pa.
Peoria, Pekin & Jacksonville	R. F. Hurd	R. F. Hurd	Pekin, Ill.
Peninsular	T. G. Templeton.		Battle Creek, Mich
Portland & Rochester	John G. Brady	John G. Brady	Portland, Me.
Portland & Kennebec	John Ellis	J. W. Trussel	Augusta. Me.
Portland & Oxford Central	Geo. W. Battles.	Geo. W. Battles.	Buckfield, Me.
Portland, Saco & Portsmouth	John Donnell		Portland, Me.
Port Royal			Beaufort. S. C.
Port Hope, Lindsay & Beaverton	H. G. Taylor	H. G. Taylor	Port Hope, Can.
Port Huron & Lake Michigan	R. C. Stewart	R. C. Stewart	Port Huron, Mich.
Providence, Warren & Bristol	Rufus Smith	J. Brightman	Bristol, R. I.
Portsmouth, Gt. Falls & Monmouth	James Tucker	E. Fall	Union Village, N.H.
Petersburg & Weldon	R. B. Andrews	Alex. Wright	Petersburg, Va.
Providence & Worcester	Joseph Kelly	Olney L. Smith	Providence, R. I.
Poughkeepsie & Eastern	John L. Driscoll.	John L. Driscoll.	Poughkeepsie, N. Y.
R			
Raleigh & Gaston	J. B. Gayle	J. B. Gayle	Raleigh, N. C.
Richmond, Fredericksburg & Potomac	H. Kuhn	W. H. Trainham	Richmond, Va.
Richmond Danville & Piedmont	John McFarland	H. Longest	Richmond, Va.
Richmond & Petersburg	John O'Brien	J. J. Martin	Richmond, Va.
Richmond & York River	C. H. Harris	J. L. Thompson	Richmond, Va.
Rome, Watertown & Ogdensburg	Wm. Jackson	H. H. Sessions	Rome. N. Y.
Reading & Columbia	B. Van Lew		Columbia, Pa.
Rome, Georgia	O. W. Harbin	O. W. Harbin	Rome, Ga.
Rochester & Genesee Valley	M. E. Brown	M. Wilder	Buffalo, N. Y.
Rockford, Rock Island & St. Louis	J. F. Nolte		Beardstown, Ill.
Rutland	N. L. Davis	Frank Sessious	Rutland, Vt.
S			
San Francisco & San José	R. B. Bishop	Frank Bellisle	San Francisco, Cal.
St. Croix & Lake Superior			New-York City.
St. Croix & Penobscot	Edward Bolton	A G. Page	Milltown, Me.
St. Lawrence & Ottawa	Calvin Dame	Calvin Dame	Prescott. Canada.
St. Louis & Iron Mountain	O. A. Haines	Oscar Doolittle	Carondelet, Mo.
St. Joseph & Denver City	E. Sleppy		Elwood, Kan.
San Antonio & Mexican Gulf	W. T. Bingham		Victoria, Texas.
South Side of Long Island	A. P. Doane	M. Heitzman	Williamsburg, L. I.
St. Paul & Sioux City	Jas. G. Butterfield		Shakopee, Minn.
St. Louis, Vandalia, T. Haute & Ind.	C. R. Peddle	H. Kirmse	Terre Haute, Ind.
South-Carolina	W. B. Smith	John Reed	Charleston, S. C.
South & North-Alabama	Tho. Jeffries	Tho. Jeffries	Lime Station, Ala.
Southern Central	Chas. G. Brown	H. Mooney	Auburn, N. Y.
Southern Minnesota	Wm. Lininger		Wells, Minn.
Southern of Canada	Albert Congdon	Albert Congdon	Fort Erie.
South-Western of Georgia	C. D. Wall		Columbus, Ga.
South-Western of Georgia	D. M.Gogul	James A. Knight.	Macon, Ga.
South Shore	Warren E. Ray		Cohasset, Mass.
Stanstead, Shefford & Chambly	W. H. Smith	M. Sessions	Waterloo, C. E.
Schuylkill & Susquehanna	John E. Wootten.	John E. Wootten.	Reading, Pa.
Seaboard & Roanoke	J. B. Pendleton	J. B. Pendleton	Portsmouth, Va.
Stonington & Providence	J. H. Anderson	J. H. Anderson	Providence, R. I.
Selma & Gulf	Wm. T. Daughtrey		Selma, Ala.
Selma, Rome & Dalton	A. G. Maynes	W W. Peirce	Selma, Ala.
Sioux City & Pacific	Charles Foster	J. R. Dow	Missouri Val., Iowa.
Spartanburg & Union	J. N. Benner	Jacob Rice	Union C. H., S. C.
Sheboygan & Fond du Lac	— Patterson	J. H. Erwin	Sheboygan, Wis.
Sullivan & Erie			Tonawanda, Pa.
Syracuse & Binghamton, N. Y	B. G. Merrill	B. G. Merrill	Syracuse, N. Y
Sycamore & Cortland			Sycamore, Ill.
St. Louis & South-Eastern	L. B. Salisbury		Mt. Vernon. Ill.
St. Louis, Kansas City & Northern	John E. Calhoun	C. S. Buck	St. Louis, Mo.
T			
Taunton Branch			Taunton, Mass.
Tioga	Peres Bonny	D. H. Stratton	Blossburg, Pa
Texas & New-Orleans	R. B. Baer		Houston. Texas.
Tennessee & Pacific	William McKeand.	William McKeand.	Nashville, Tenn.
Toledo, Wabash & Western	W. F. Ray		Fort Wayne, Ind.
Toledo, Wabash & Western		David Hoit	Toledo. Ohio.
	T. G. Gorman		Springfield, Ill.
Toledo, Peoria & Warsaw	A. H. De Clerq	R. M. Hemphill	Peoria. Ill.
Troy & Boston	Foster Church	R. V. Coon	Troy, N. Y.
Toronto, Grey & Bruce			Toronto, Can.
U			
Union Pacific	I. H. Congdon	Geo. E. Stevens	Omaha, Nebraska.
Utica & Black River	Wm. E. Granger	David James	Utica, N. Y.
Utica, Chenango & Susquehanna	C. H. Brown		Utica, N. Y.
V			
Vicksburg & Meridian	Jas. B. Brown		Vicksburg, Miss.
Vineland			Vineland, N. J.
Vermont Central	J. M. Foss	Milton Sessions	St. Albans, Vt.
Vermont & Massachusetts	D. T. Davis	Jacob Marsh	Fitchburg, Mass.
W			
Wicomico & Pocomoke			Berlin, Md.
Wilmington, Charlotte & Rutherford	W. A. Gill	Thomas Myers	Laurenburg, N. C.
Wilmington, Columbia & Augusta	George Hall	W. J. Calais	Wilmington, N. C
Westchester & Philadelphia	John Moyer	N. Pawling	Philadelphia, Pa.
Wilmington & Weldon	John Bissit	John Bissit	Wilmington, N. C.
Wilmington & Western			Wilmington, Del.
West-Jersey	W. McAllister	C. C. Wilhams	Camden, N. J.
Western Maryland	R. V. Dohoney	J. H. Nussear	Union Bridge, Md.
Winona & St. Peter	F. C. Ford	H. L. Preston	Winona, Minn
Western North-Carolina	E. H. Marsh	E. H. Marsh	Salisbury, N. C.
Western R. R. N. C	M. W. Atkinson	M. W. Atkinson	Fayetteville, N. C.
West-Feliciana	R. C. Brower		Woodville, Miss.
Western & Atlantic	John H. Flynn	John Sherman	Atlanta, Ga.
Worcester & Nashua	George H Griggs.	George H. Griggs.	Worcester, Mass.
Welland	William Wells	William Pay	St. Catharine, C. W.
Washington & Ohio	Nathaniel Hayes	Joshua Harrison	Alexandria, Va.

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Arlington Car Manufacturing Co	Arlington, Vt.
Atlantic Car Works	Salem, Mass.
Barney & Smith Manufacturing Co	Dayton, Ohio.
Baker, Jackson & Co	Latrobe, Pa.
Billmeyer & Smalls	York, Pa.
Bradley, Osgood	Worcester, Mass.
Bridgeport Car Works	Bridgeport, Pa.
Brill, J. G. & Son	Philadelphia, Pa.
Bitner, George W	Pittsburg, Pa.
Buffalo Car Co	Buffalo, N. Y.
Canada Car Co	Toronto, Canada.
Canda, F. E & Co	Chicago, Ill.
Canada Steam-Engine Co	Kingston, Canada.
Cartersville Car Co	Cartersville, Ga.
Central Car & Manufacturing Co	Jackson, Mich.
Clendenning, W. W	Montreal.
Cummings Car-Works	Jersey City, N. J.
Connellsville Machine and Car Co	Connellsville, Pa.
Detroit Car and Manufacturing Co	Detroit, Mich.
Detroit Car Works	Detroit, Mich.
Dawson Manufacturing Co	Dawson, Ga.
Dickey, Neill & Co	Toronto.
Dickson Manufacturing Co	Scranton, Pa.
Erie Car-Works	Erie, Pa.
Elmira Car-Works	Elmira, N. Y.
Fredericks & Co	Catasauqua, Pa.
Fremont Car Co	Fremont, Ohio.
Gardner, F. & Co.	Carlisle, Pa.
Gill, John L	Columbus, Ohio.
Gilbert, Bush & Co	Troy, N. Y.
Goold, James & Co	Albany, N. Y.
Goodrich Car Co	Augusta, Ga.
Haskell & Barker	Michigan City, Ind.
Hart, Jonas S. & Co	Troy. N. Y.
Harrisburg Car Manufacturing Co	Harrisburg, Pa.
Heathcote, Herbst & Co	Glen Rock, Pa.
Hamilton, William & Son	Toronto.
Harlan & Hollingsworth Co	Wilmington, Del.
Highspire Car & Manufacturing Co	Highspire, Pa.
Indiana Car Co	Cambridge City, Ind.
Jackson & Sharp Co	Wilmington, Del.
Jackson & Woodin Manufacturing Co	Berwick, Pa.
Jones, J. M. & Co	West-Troy, N. Y.
Kimball Manufacturing Co	San Francisco, Cal.
Keith, H. T. & I. N	W. Sandwich, Mass.
Laporte Car Manufacturing Co.	Laporte, Ind.
Lombard, Thomas	Augusta, Me.
Lebanon Manufacturing Co	Lebanon, Pa.
Lehigh Car Manufacturing Co	Stemton, Pa.
Litchfield Car Manufacturing Co	Litchfield. Ill.
Stephenson, John & Co	New-York, N. Y.
Michigan Car Co	Detroit, Mich.
McNairy, Claflen & Co	Cleveland, Ohio.
Murray, Dougall & Co	Milton, Pa.
McVay, Walker & Co	Braddock's Field, Pa.
Mowry Car and Wheel Works	Cincinnati, O.
Middletown Car & Manufacturing Co	Middletown, Pa.
Missouri Car and Foundry Co	St. Louis, Mo.
New-Haven Car Co	New-Haven. Ct.
Niblo, James M	Conshohocken, Pa.
Ohio Falls Car Co	Jeffersonville, Ind.
Ontario Car Co	London, Ont.
Patten Car Works	Bath, Maine.
Peabody & McDonald	Calais, Me.
Peters, Simon	Quebec.
Pittsburg and McKeesport Car Co	McKeesport, Pa.
Pittsburg Car and Locomotive Co	Pittsburg, Pa.
Philadelphia Car-Works	Philadelphia, Pa.
Portland Co	Portland, Me.
Pullman Car Co	Chicago.
Peregoy, J. H	Houston, Texas.
Quealy Car & Iron Works	Hannibal, Mo.
Ranlet Car Manufacturing Co	Laconia, N. H.
Russell & Co	Massillon, Ohio.
Sands, William L	Pottstown, Pa.
Schall, Michael	York, Pa.
Shaaber & Johnston	Reading, Pa.
Southern Car-Works	Independence, La.
South-Western Car Co	Jeffersonville, Ind.
Shoenberger & Bryant	Duluth, Minn.
Seath & Hager	Terre Haute, Ind.
Taunton Car Co	Taunton, Mass
Tredegar Co	Richmond, Va.
Tiffin Car-Works	Tiffin, Ohio.
Vigo Foundry and Terre Haute Car-Works	Terre Haute, Ind.
Wharton, Thomas J	Brunswick, Ga.
Whittaker, Phillips & Co	Toledo, Ohio.
Wason Manufacturing Co	Springfield, Mass
Weimer, P L & Bros	Lebanon, Pa.
Wyoming Valley Manufacturing Co	Wilkesbarre, Pa.
Wells, French & Co	Chicago, Ill.
Wilmington Car-Works	Wilmington, Del.

Car-Wheel Manufacturers.

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Atlantic Iron-Works	Portsmouth, Va.
Baltimore Car-Wheel Foundry Co	Baltimore, Md.
Barnum & Richardson Manufacturing Co	Chicago, Ill.
Barney & Smith Manufacturing Co.	Dayton, Ohio.
Bass & Hanna	Fort Wayne, Ind.
Bailey, Howson & Co	St. Paul, Minn.
Boston Car-Wheel Co	Camb'gep't, Mass.
Bowler, Mayer & Brayton	Cleveland, Ohio.
Davenport, Fairbairn & Co	Erie, Pa.
Dawson Manufacturing Co	Dawson, Ga.
Detroit Car-Wheel Works	Detroit, Mich.
Fulton Foundry Co	Cleveland. Ohio.
Gill & Bidwell	Allegheny City, Pa.
Green, D. P. & Co	St. Louis, Mo.
Hamtramck Car-Wheel Works	Detroit, Mich.
Harrisburg Car Manufacturing Co	Harrisburg, Pa.
Hart, Jonas S. & Co	Troy, N. Y.
Jackson & Woodin	Berwick, Pa.
John L Gill	Columbus, Ohio.
Lobdell Car-Wheel Works	Wilmington, Del.
Louisville Car-Wheel & Railway Supply Co	Louisville, Ky.
Middlebrook & Mack	Oswego, N. Y.
Missouri Car and Foundry Co	St. Louis, Mo.
Moore Elastic Car-Wheel Co	Jersey City, N. J.
Mowry Car and Wheel Works	Cincinnati, Ohio.
Ohio Falls Car Co	Jeffersonville, Ind.
Pettengill, Glass & Co	Cleveland, Ohio.
Quealey, W. J	Hannibal, Mo.
Ramapo Wheel & Foundry Co	Ramapo, N. Y.
Sterling Car-Wheel Foundry	Columbus, Ohio.
Scoville, J. & N. C	Buffalo, N. Y.
St. Louis Car-Wheel Co	St. Louis, Mo.
Taylor Iron Works	High Bridge, N. J.
Thompson, Douglas	Bordentown, N. J.
Tredegar Company	Richmond, Va.
Toronto Car-Wheel Co	Toronto, Can.
Washburn, Hunts & Co	Jersey City, N. J.
Washburn Car-Wheel Manufacturing Co	Worcester, Mass.
Wason Manufacturing Co	Springfield, Mass.
Whitney A. & Sons	Philadelphia, Pa.
Woodbury & Company	E. Cambr'ge, Mass.
Wyoming Valley Manufacturing Co	Wilkesbarre, Pa.

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Brooks Locomotive Works	Dunkirk, N. Y.
Danforth & Cooke	Paterson, N. J.
Dawson & Baily (light locomotives)	Pittsburg, Pa.
Dickson Manufacturing Co	Scranton, Pa.
Grant Locomotive Works	Paterson. N. J.
Hinckley & Williams	Boston, Mass.
Manchester Locomotive Works	Manchester, N. H.
Mason, William	Taunton, Mass.
McKay Iron and Locomotive Works	Jersey City, N. J.
Portland Company	Portland. Me.
Porter, Bell & Co. (light locomotives)	Pittsburgh, Pa.
Pittsburg Locomotive Works	Pittsburg. Pa.
Rogers Locomotive Works	Paterson. N,J.
Rhode Island Locomotive Works	Providence R. I.
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Bunions, Bad Nails, Joints, Warts, Wens, and all Diseases of the Feet cured without Pain by

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Address IRON CLAD PAINT COMPANY,

CLEVELAND, OHIO.

This Company owns and manufactures under WM. GREEN'S several patents, and is the only Company in the world that makes Paint from pure hard Lake Superior Iron Ore, such as is used in furnaces for making Pig Iron.

The most Economical, Most Fireproof, Most Waterproof, Most Durable, and Most Useful Paint made.

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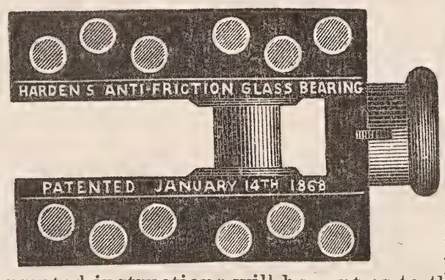
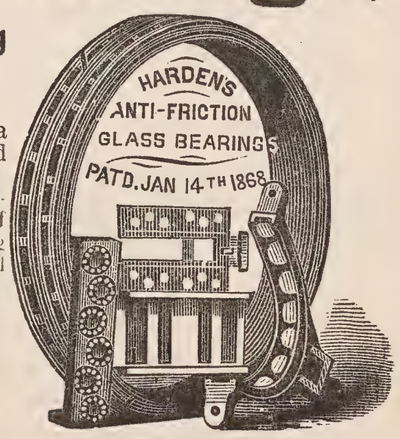


For Cross Heads and other Working Parts of Machinery.



These Bearings have been in successful operation on a large number of the leading railroads in the United States for over three years.

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NEWARK VARNISHES,

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Wearing Body.—For finishing, or last coat on railroad cars, coach bodies, and all work exposed to the weather. Works free under the brush, flows down smoothly, has a brilliant gloss, and is very durable.

Wearing Body, Quick Drying.—Is used for the same purposes as the Wearing Body.

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Black Asphaltum.—Is used for smokepipes, iron railings, castings, hardware, saddlery, and iron work generally.

Polishing, Quick Drying, Extra Light Shade.—For the inside work of railroad cars, for pianos, light furniture, etc., etc.

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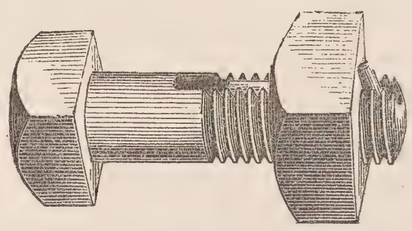
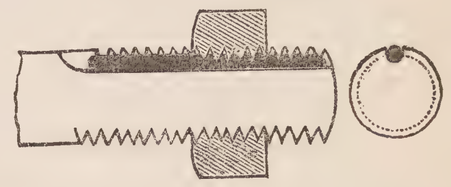


"CUMMING NUT-LOCK,"

Patented

June 16, 1868,

August 23, 1870.



SECTIONS.

Unequaled for CHEAPNESS, SIMPLICITY & EFFECTIVENESS.

This simple device, as will be seen by the engravings, consists of a groove being cut in the threaded part of a screw bolt into which is placed a key of copper wire, or other soft metal; when the nut is screwed on, it cuts a thread on the key, thereby making it impossible for the key to get out until the nut is taken off. When the nut is screwed up to its place, that part of the key over which the nut has passed is riveted up against the nut with a small punch, destroying the thread on the key. The nut, therefore, can not move backward until force is used, as with a wrench.

The groove can be rapidly cut with a simple machine designed for the purpose.

Experience has proved this device absolutely reliable, and it is the cheapest of all known devices for the purpose. By its use, old bolts on which the nuts have become too slack for use can be made as good as new, making it a great saving to railroad companies and others in that item alone. It is cheaper than a check-nut.

If the bolt should become slack from shrinking of timber or other causes, *the nut will always remain firmly attached to the bolt*, and, with the wrench, can be screwed up *any distance*, and the wire riveted up any number of times, or can be taken off without injury to the nut or bolt.

This is the only method in use that locks the nut firmly to the bolt without regard to place or surroundings, all others require some attachment that holds the bolt in its position, and a washer or other attachment to keep the nut from turning.

DIRECTIONS FOR USE.—Place the copper key in the slot, pointed end out, and beveled side up, in such a position that when the nut is screwed to its place about three-eighths of an inch of the key will project beyond its outer face. Then screw the nut to its place *over the key*, allowing it to cut its own thread in the copper. Then take a narrow flat set punch, and rivet the projecting part of the key *solidly* against the outer face of the nut. To tighten the nut: screw it up, and rivet the key tighter. To remove the nut: simply apply the wrench and unscrew the nut. It will cut its own way out through the copper. The same key can be used several times, by moving it outward a few threads in the slot.

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The [purest] Metallic Paint in Market.

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(For Finishing Outside.)

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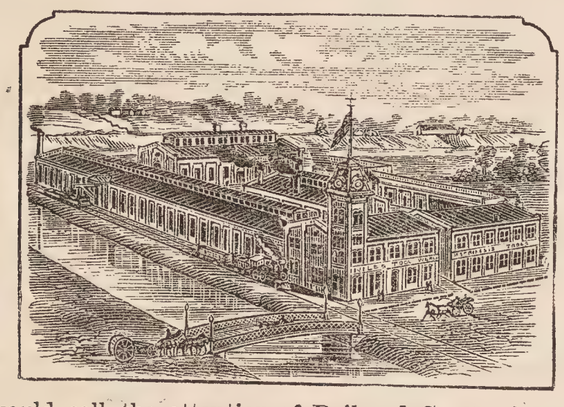

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Car Axle Lathes, (Gray's Patent,)
Car Wheel Borers,
Hydrostatic Wheel Presses, etc.

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Office, 131 West Second St., Cincinnati, Ohio.

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MANSFIELD CAR WORKS,

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Capacity, Six Cars per Day.

This Company have one of the largest shops in the West, well stocked with the best of tools adapted to the work, and located at a point possessing unrivaled facilities for procuring the

CHOICEST OF LUMBER,

and, at the same time, being adjacent to the coal and iron region.

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E. H. REES, Superintendent.

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We invite the attention of the trade, including

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To our variety of styles of ornaments, made to match black walnut in color, and which are perfectly fitted for use where not exposed to the weather. They have been sold extensively for several years, and have given entire satisfaction—so that all who have once used them have become constant consumers. They are artistic in design and unequaled in execution, being the production of the best artists, carvers, die sinkers, and moulders.

These ornaments hold glue and screws as well as carvings. They do not warp or crack. They are unaffected by changes of temperature, and withstand dampness as well as furniture. They will polish in every respect equal to wood, either with shellac, oil, wax, or varnish, and with less trouble, as there is no open grain to fill. They will gild or bronze beautifully by simply sizing, without any other preparation.

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Also Silver-Plating and Bronzing.

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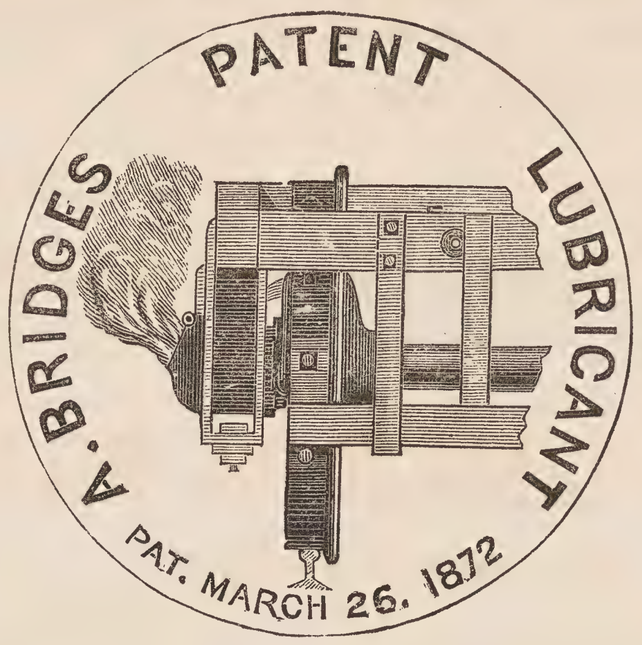
GREAT SAVING IN OIL!

And hot journals entirely prevented by the use of



For Railroad Car Journals and other Bearings.

In presenting this Lubricant to the notice of Railroad and Steamboat Managers and Operators in Machinery generally, I do so with a practical knowledge of its merits, and with confidence that it will be found to possess invaluable qualities as a

Lubricator and Counteractor of Friction.

It has been in use, during the past two years, on a number of Railroads and Steamers, and is highly approved of.

Parties wishing to make a practical test of the Lubricant will be furnished with sample on application.

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ABOUT LIGHTING PASSENGER CARS.

A Law has passed the Massachusetts Legislature (May 29, 1872) prohibiting the use of oil below 300° fire test, instead of 110° as heretofore. The

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meets the requirements of this law. It is now used by **all the Roads leading from Boston,** and by many other Roads, and by a large number of **Pullman's Palace Cars,** in the place of kerosene or candles.

THE LIGHT IS EQUAL TO KEROSENE

and the expense not half that of candles.

To use this oil in our common car lamps, now in use in all parts of the country, it is only necessary to **Change the Burner,** (costing about 50 cents per lamp.) For new lamps, in place of candles, send for lithograph and price-list. This oil is 55 cents per gallon in Boston, New-York, Pennsylvania, etc.

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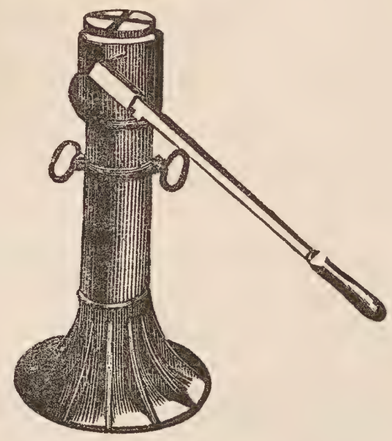

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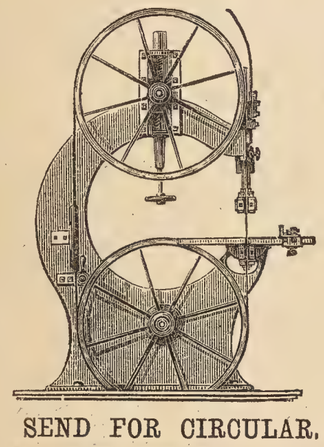

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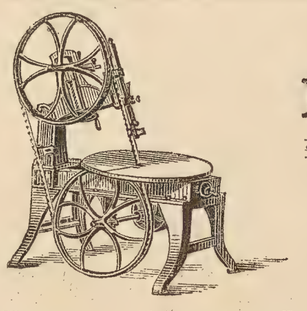

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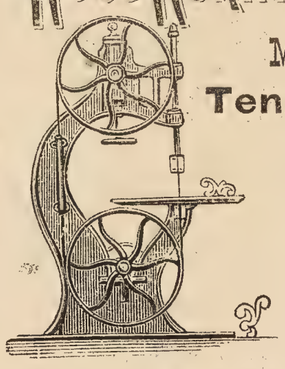

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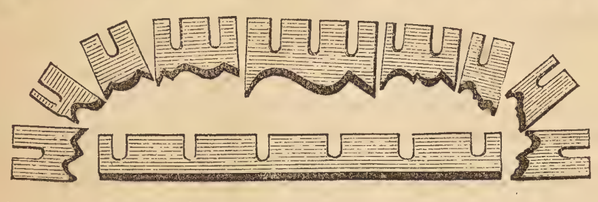

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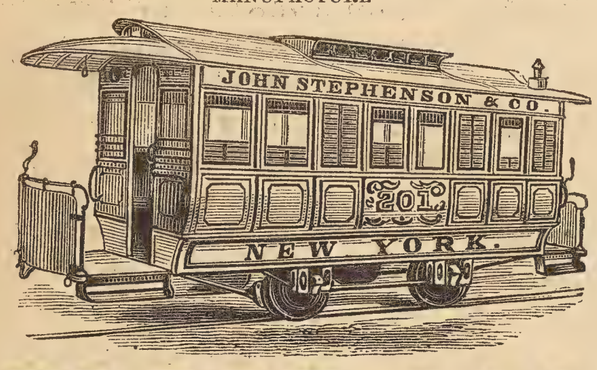

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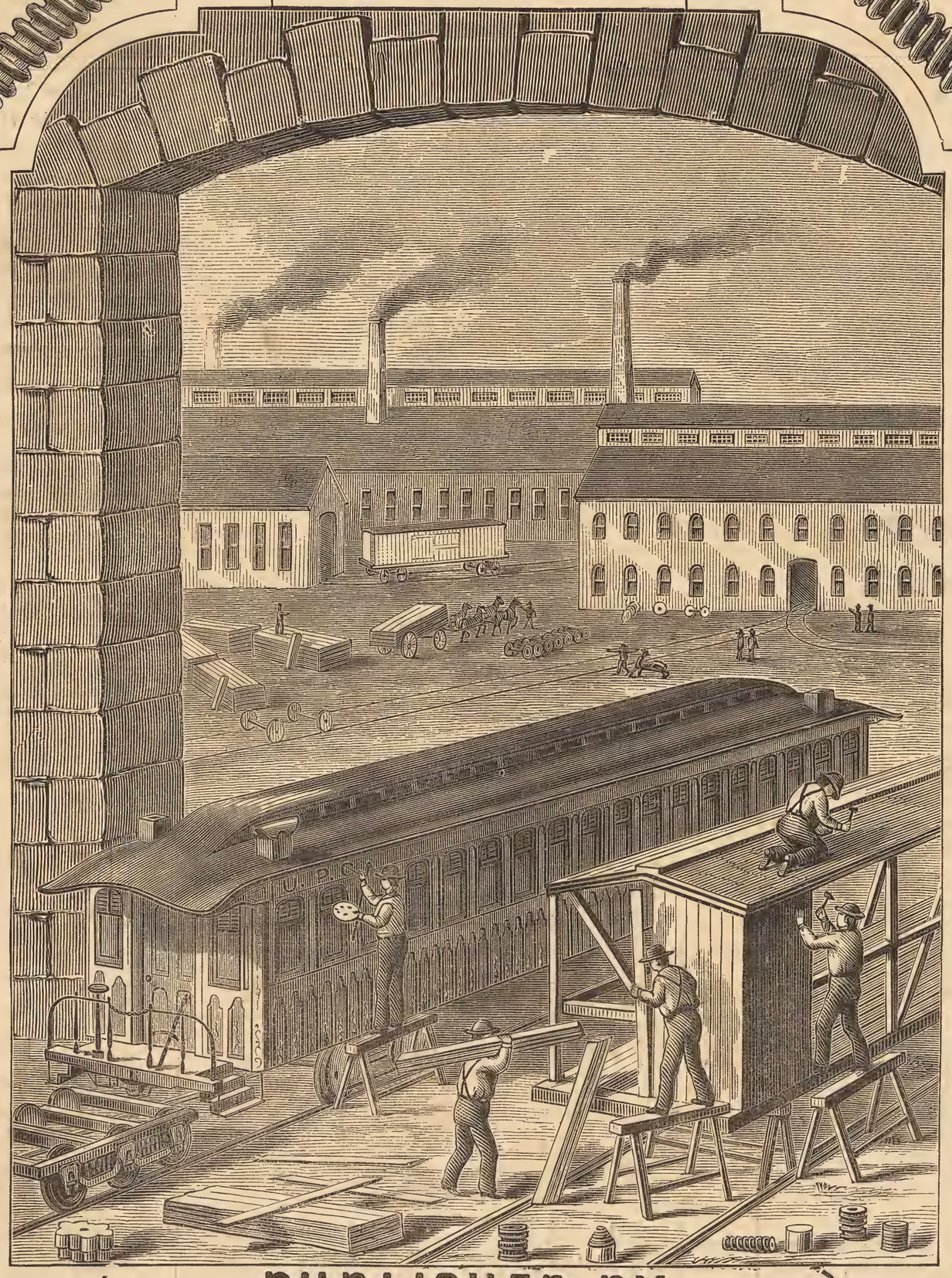

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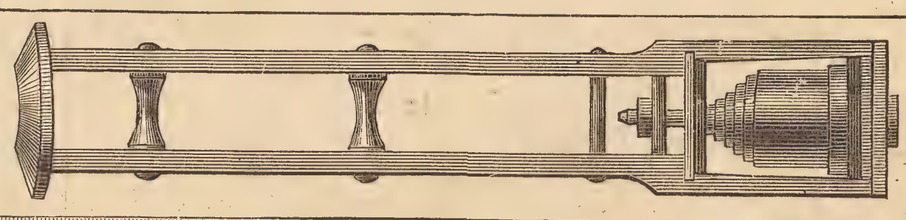

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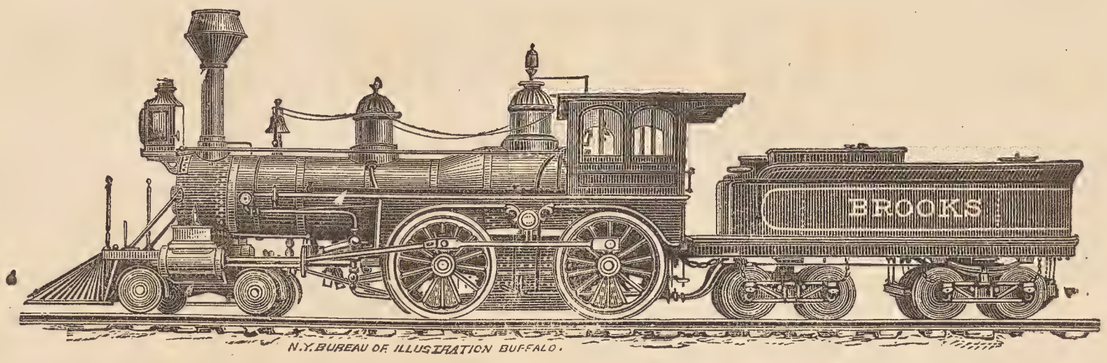

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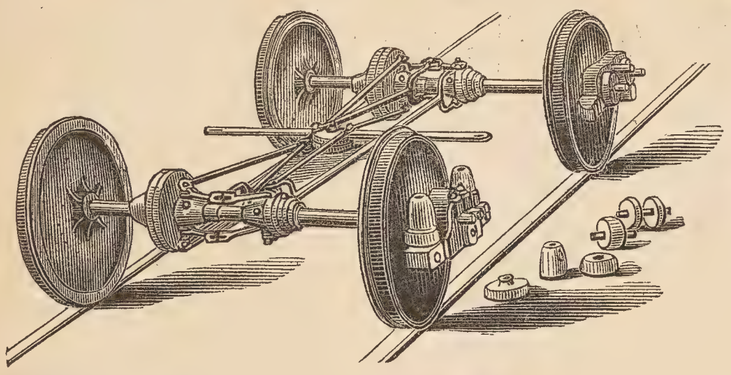

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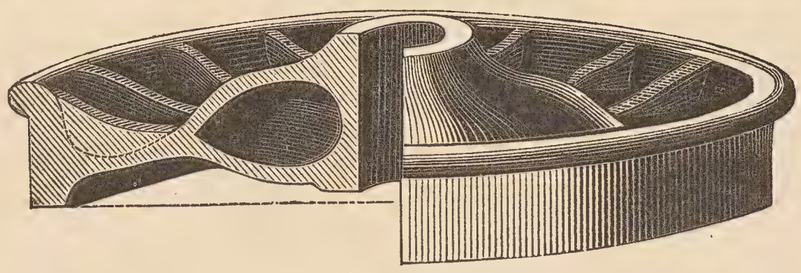

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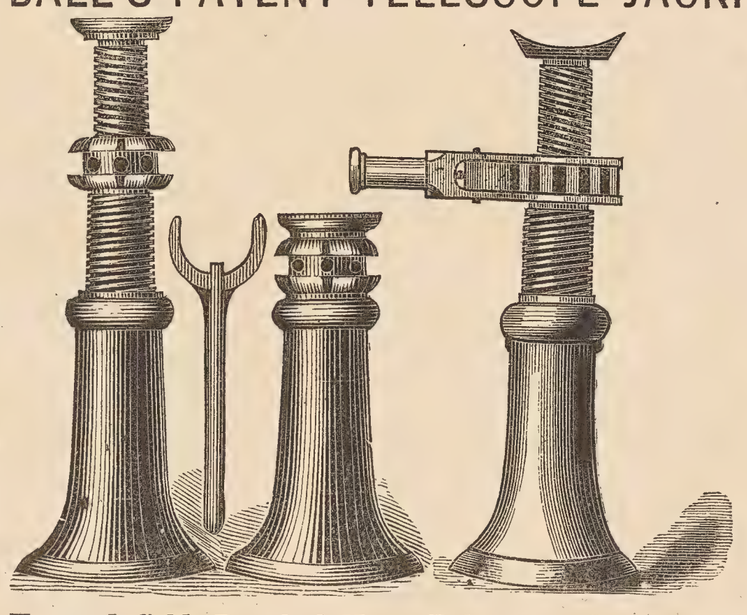

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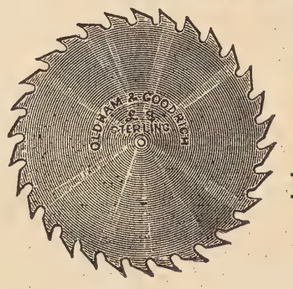

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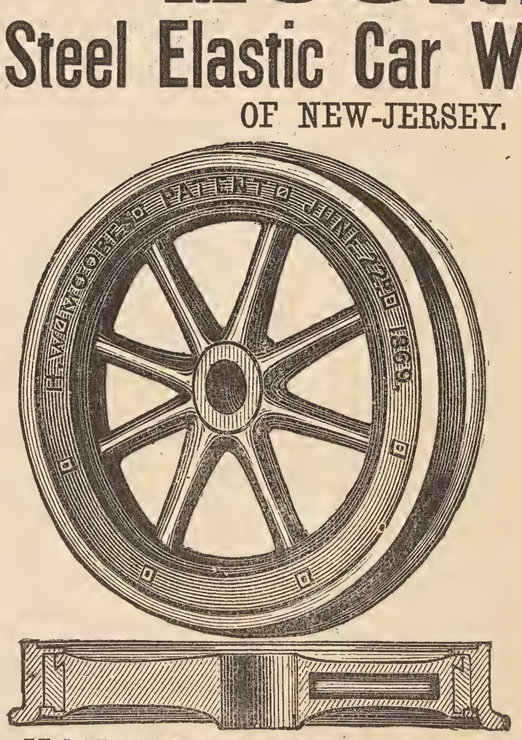

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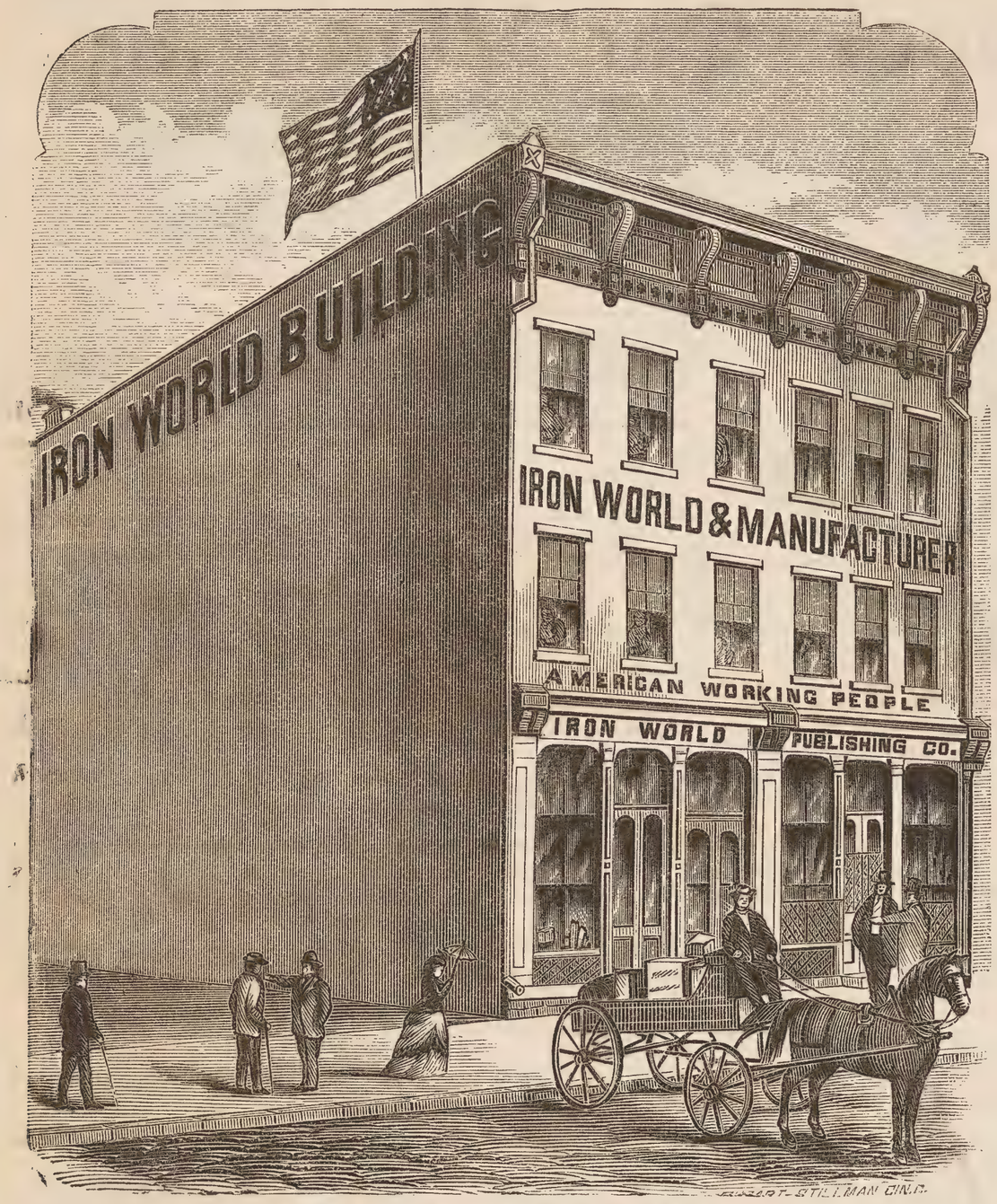

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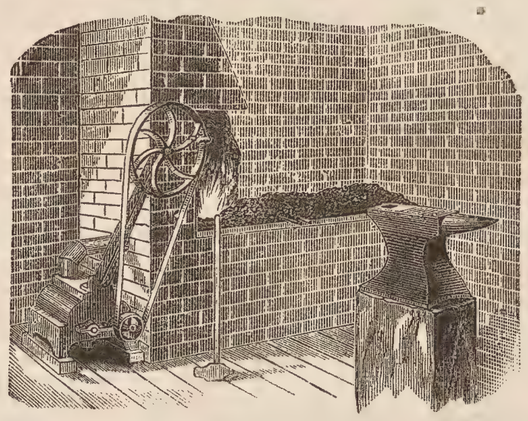

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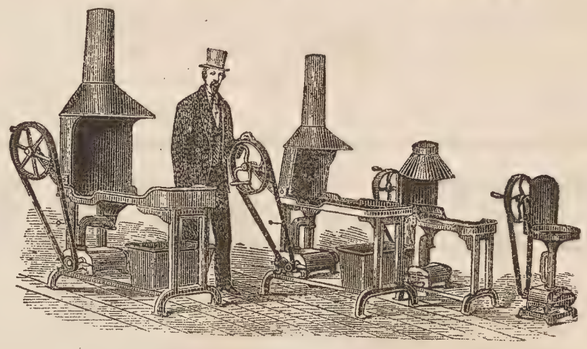

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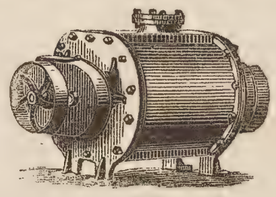

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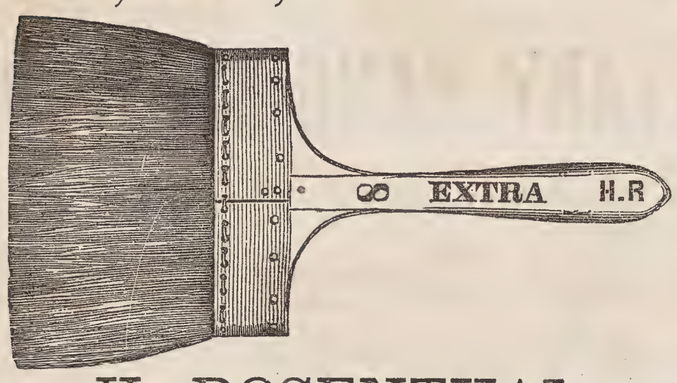

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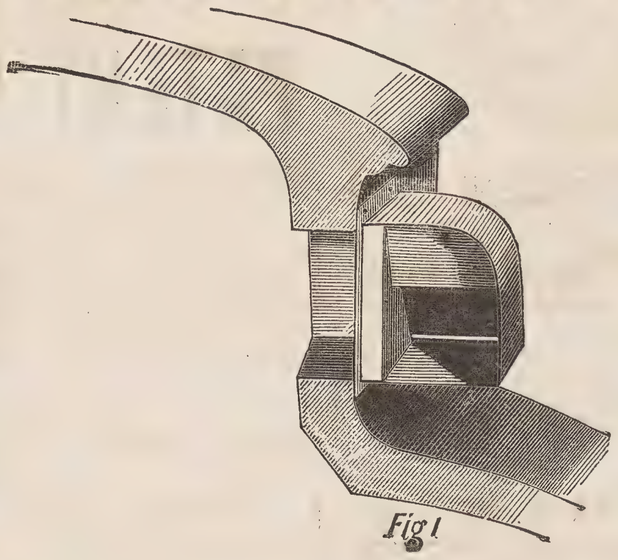

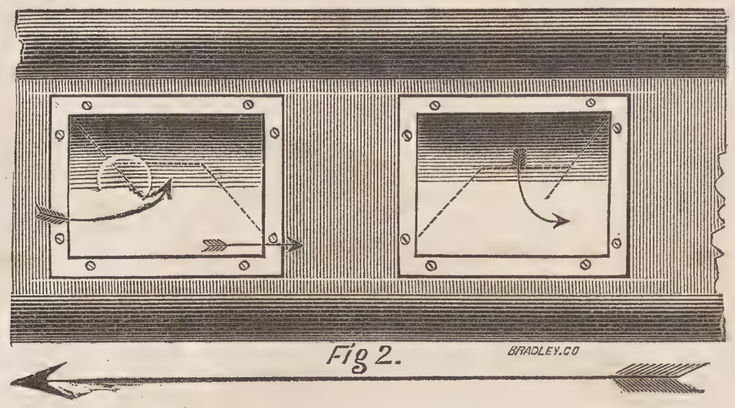

THE Ventilators are placed as usual in the car roof as shown in Fig. 1, their mouths facing alternately in opposite directions, those facing forward admitting the air, and those facing backward affording an exit. Fig. 2 represents a side section of the raised roof with two of the ventilators alternately arranged. When the car is moving in the direction indicated by the arrow, it will be seen, by the curved darts, that there is an ingress and egress of air constantly taking place. The operation of the ventilators is reversed with precisely the same effect, when the car moves in the opposite direction. The internal structure is such that the dust and cinders passing into the mouth of the ventilator are intercepted by striking against two shields, shown in Fig. 1, and indicated by dotted lines in Fig. 2, and are thus naturally thrown to the bottom, where they are carried out through a small opening as shown in Fig. 1, and by the straight dart in Fig. 2, a current of pure air being forced into the car at the sam time through a lateral opening. The faster the car moves, the greater is the quantity of air admitted and expelled, thus securing a free circulation which does not subject the occupants to a direct current or draught. The ventilator is also noiseless in its operation. There is no clattering of valves, and no change is necessary when the car reaches its destination. Once put in place, it is always in readiness, and runs itself independent of all employees.

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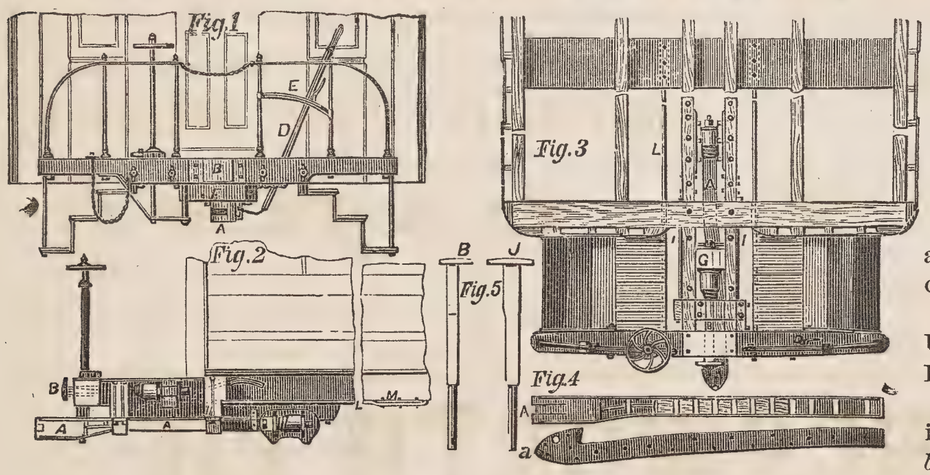

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DESCRIPTION.

Figure 1 is an elevation; Figure 2, a longitudinal section; Figure 3, a plan of an end of a car to which the arrangement has been applied: and Figures 4 and 5 show top and side views of the "Hook" and "Buffer," drawn on a larger scale than that of Figures 1, 2, and 3.

The letters refer to the same parts in all the figures. A is the coupling "Hook," B the "Buffer," C the "Stop," D the "Lever," E the "Quadrant Ratchet," F the "Truss Beam," G the "Spring Beam," H the "Suspender Beam," I the "Upward Trusses," K the "Main Spring," L the "Downward Trusses," and M the "Bolster."

The Platforms, instead of being located below the centre line of the main sills of the cars, are placed *in* that ine, and held there by the Trusses I and L, so that the point of contact (in Buffers B) is *in* the said centre line and *not below* it.

The coupling "Hook" A is attached to the draw spring the same as the ordinary draw head, and at the same height above the track, but in such a manner that the outer end is free to move laterally for a short distance. The Coupling Hook projects beyond the platform. The Stop C is placed under the Buffer Beam to prevent accidental uncoupling. When two cars are brought together, the Coupling Hooks, from *their shape*, push each other aside, until the Buffers B are compressed hard on the Buffer Springs, then—*the points of the hooks having passed each other sufficiently far*—the Hooks are carried forward by their main-springs, and thus the "*Coupling*" and "*Compression*" are both effected automatically *and at the same time*, and without the use of links and pins. When two cars are thus coupled together, the *head* of the *Hook* of each car is under the Buffer Beam of its opposite car, and the platforms are close together, (about 4 inches apart.) The effect of this is, *one platform can not be forced over the other*, nor can a *child* fall between the platforms; the dust and rain are nearly all shut out; the "Compression" makes the train run steadily, and prevents all jerking at starting and stopping.

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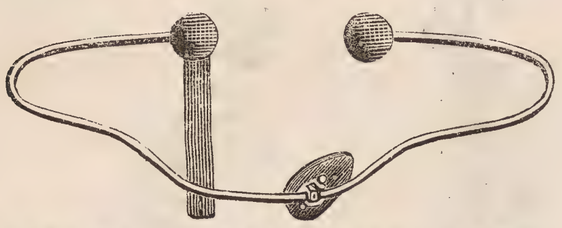

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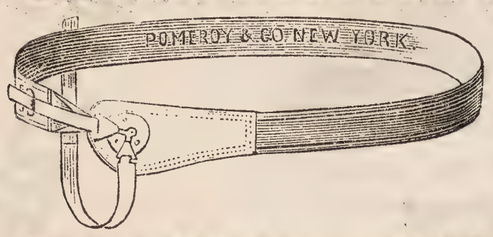

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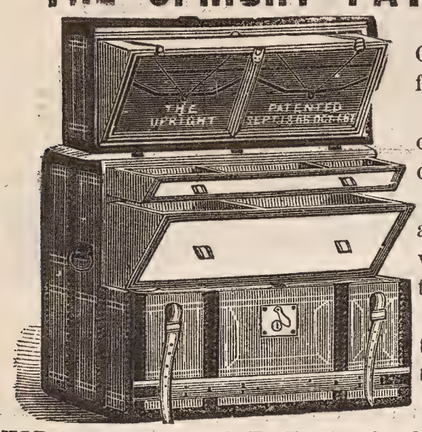
THE UPRIGHT PATENT TRUNK



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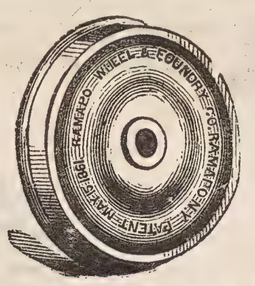

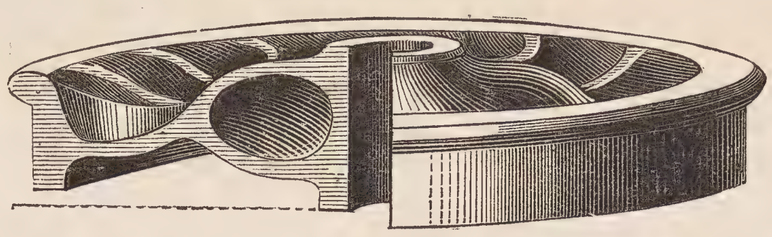

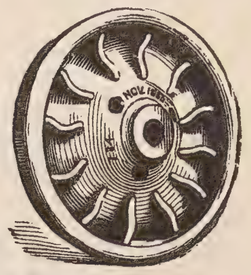

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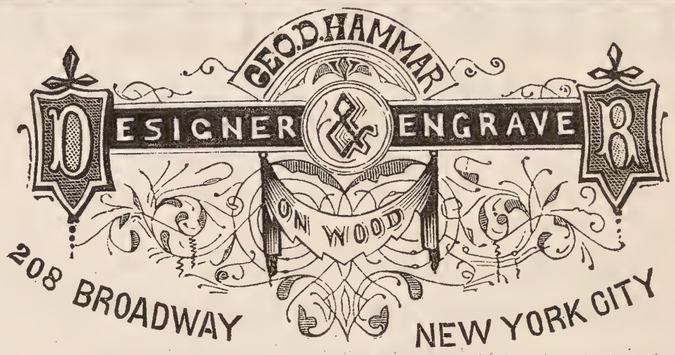

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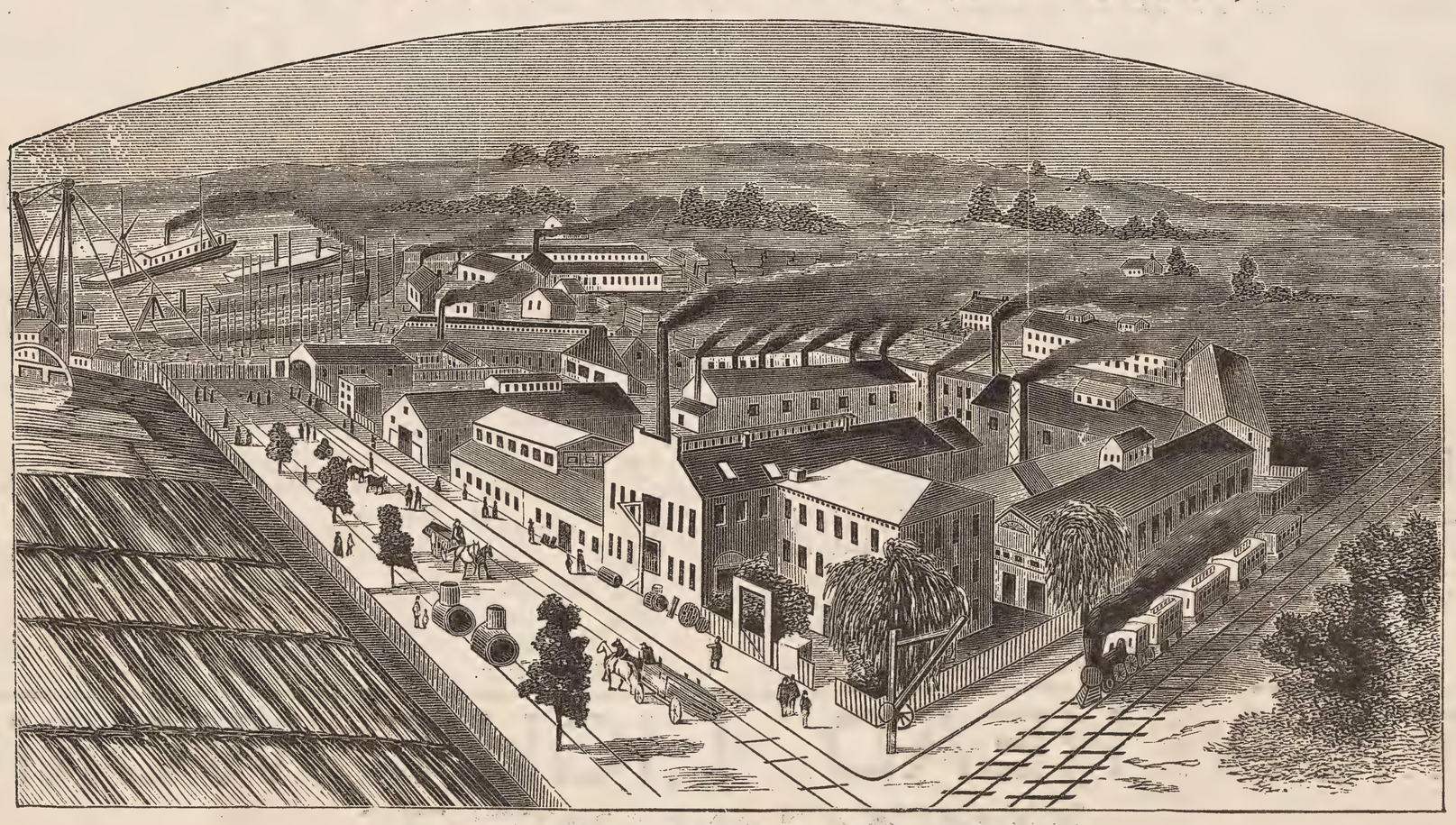

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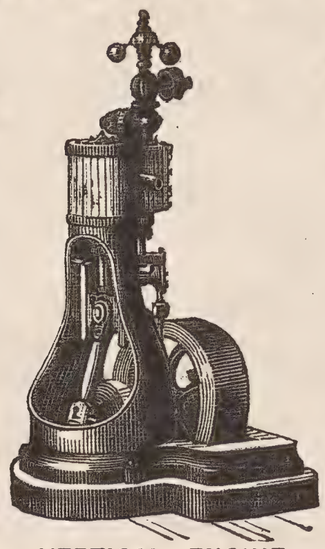

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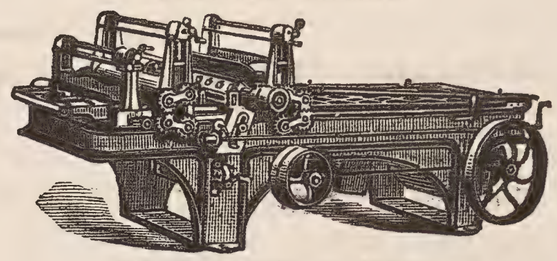

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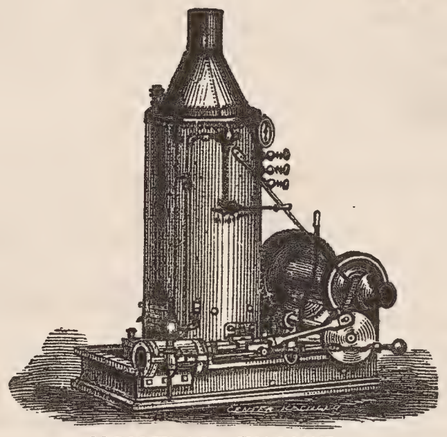

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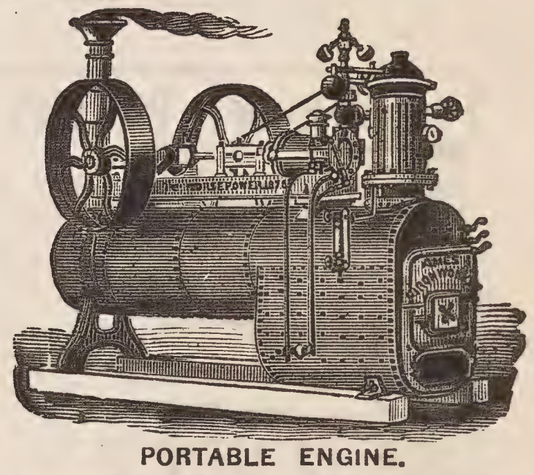

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Dec. 1872

THE NATIONAL CAR BUILDER.

DEVOTED TO THE INTERESTS OF RAILWAY ROLLING STOCK.

Vol. III. No. 6. | DECEMBER, 1872. | 50 Cents per Annum. Single Copies, 10 Cents.

The Life of Rails.

It is hardly safe now to regard any estimate of iron rails. Not that iron rails can not be made that will show good wearing results, but from the fact that, with very few exceptions, none are made. On the Boston and Albany Railway some 12,000 tons of iron rails were laid last year, and of this amount 800 tons have been removed from the track as useless or unsafe. The managers of this road, in common with most others having roads of large traffic, have resolved to adopt the use of steel rails hereafter, and we learn that they have bought some 9000 tons of steel rails in Europe, 4000 tons of which will arrive and be put in the track this season, and the balance during the next summer.

The duration or life of rails depends upon the quality of the iron of which they are made, and upon the amount and speed of the traffic passing over them. The rails first made in England were rolled from best No. 1 cold blast mine iron, run out in a finery fire, puddled, shingled, rolled into bars, and were cut, piled, heated, and hammered into blooms, and these were reheated and rolled into rails. The result was a material such as is rarely seen upon our railways at the present time. The old 45 pounds Reading rail bore an immense traffic for twenty years, and a like character of rail on the Boston and Providence road lasted some thirty years, and many of these rails are now in use on the road, though not in exposed positions. The iron at first used upon English roads in many cases withstood from fifteen to twenty years of wear under an enormous traffic. It was estimated in 1849, upon the London and North-Western Railway, that fifty trains a day for twenty years, or 313,000 trains, would wear out a seventy pounds rail. With the material now put into railway tracks, however, no such service is obtained. Under favorable conditions, *good iron* will last eight years under an average traffic; but with the material commonly employed, from three to six years is all that can be counted upon for roads doing a good amount of work; and the life of the iron upon the great routes is in many cases less than this. Mr. Price Williams states that the average life of the best quality of iron rails has been found to be, in round numbers, 15,000,000 tons, or 100,000 trains of 150 tons each. That where from 12,000,000 to 15,000,000 tons of moderately fast traffic will wear out an iron rail, 38,000,000 tons of slow traffic are required to do the same. That the wear is greatest upon grades falling in the direction of the traffic. A mixed traffic of 62,399 trains, or of 12,000,000 tons very nearly, wore out the best rails on a 40-foot descending grade in $7\frac{1}{4}$ years, while the same description of rails upon a level, under a very heavy freight-traffic, required 203,122 trains, or 38,000,000 tons very nearly, to wear them out. For equal amounts of traffic, the wear of rails is assumed to be as the square of the speed.

With regard to the life of steel rails, every thing here again depends upon the quality of the metal. A pair of 21 feet Bessemer steel rails, upon the London and North-Western Railway, outlasted sixteen faces of iron rails, being evenly worn to a depth of a little over a quarter of an inch; having in about three years sustained the traffic of upward of 9,000,000 engines and cars, or about 95,000,000 tons. This particular pair of rails were finally destroyed by a locomotive running off the track, the wheels striking the rails transversely and badly bending and breaking them. It was estimated that they would have endured at least one half as much more tonnage but for the accident. So, too, upon the Philadelphia, Wilmington, and Baltimore Railway, a good steel rail has outlasted sixteen iron rails, the use of both being the same, and on many other roads of large traffic the same successful results have been achieved. Railway managers have got to exercise more care and discrimination in the *quality* of the rails they purchase, whether made of iron or steel. In fact, there is a good amount of pretty miserable stuff sold for steel rails, as some of the managers of New-England roads know to their cost.—*Railway Times.*

A Huge Snow-Plow.

The Union Pacific Railroad is having built, at its shops in Omaha, a snow-plow which, when finished, will be the largest and most powerful in the world. It is rapidly approaching completion, and in a few days will be ready for business. The trucks on which it is built are very heavy and strong, and were made especially for this plow. The platform on the trucks is 22 feet long and 10 feet 6 inches wide, and is composed of solid oak timbers, 8 by 16 inches. These timbers are held together by 10 iron bolts $1\frac{1}{4}$ inches in diameter, which run crosswise. This solid bed is fastened to the transom-beams by 40 bolts, 20 over each truck. The inclined slide, placed on the platform, is 22 feet long, and slopes at an angle of 30 degrees, and is held firmly to the bed by 40 bolts, an inch in diameter, and is supported from behind by inclined posts 5 feet long, 8 inches wide, and 16 inches thick. The entire length, from the rear of the platform end of the slide, is 32 feet. The slide is to be ironed, and an immense plow of the ordinary shape, 18 feet long, 11 feet wide, and 5 feet high, and covered with iron $\frac{3}{16}$ of an inch thick, is to be securely placed upon it. On the point of this plow there is to be an iron plate, steel-pointed, 11 feet long and 4 feet wide. This plate, of course, runs across the track, and only 1 inch above it. The rear of the platform will be boxed in, making a room 12 feet high, 11 feet wide, and 10 feet long, for the purpose of keeping the snow out. It will be furnished with a door, so that, if necessary, it can be loaded with iron. The monster will weigh fifty tons, and will be operated by three of the heaviest engines on the road. The cost will be over $5000. It was designed by Mr. G. E. Stevens, superintendent of the car and building-department, and Mr. J. H. Congden, general master-mechanic of the road, who must have made it a study since last winter. There will be but very few snow-drifts that this plow won't clean out: but if it ever jumps the track it will be a pretty hard job to get it on again.

Yankee Ingenuity.

American genius stands preëminent in the perfection of mechanical appliances to supersede manual work. Perfect invention to this end is, indeed, the offspring of necessity in the United States, where scarcity of hand labor has forced forward to an almost inconceivable degree human ingenuity. In this special branch of invention there can be no dispute that the Yankee can give the world long odds and beat him. In England, where labor has been always abundant and, until of late, cheap, the genius of invention has trodden rather the higher than the humbler path, has tended rather to achieve great ends than to effect simple purposes, has given mechanical handicraft less attention and devoted itself to great physical revolutions. In America, it is far different; there is scarcely an industry too humble, a labor too mechanical or common to escape the attention of the inventor, who, with an almost infinite ingenuity, sets himself to work to combine all the known mechanical movements and to invent new ones, until the sleight of the hand of the operator is imitated to the life, and the dead metal is endued with life and power with which flesh and blood can not compete.—*Engineering.*

Independent Car-Wheels.

In the Polytechnic Exhibition of Moscow is now exhibited a new method of arranging the axle-trees of railroad-cars or other vehicles, in order to facilitate the passage around curves of very short radius. The axle is cut in the middle, and the two portions are reunited by means of a long metallic sleeve. The extremities of the axle consist of a pivot and socket, so that their only point of contact is directly in the centre of their junction. Shoulders or flanges are arranged which retain the halves within the sleeve. The two portions of the axle are thus allowed to work at different velocities, by which it is believed that the successive shocks occasioned by the sliding of the wheels on the rails in rounding short curves will be avoided. This system is being applied to a tramway between Petrofsky Park and the gardens of the exposition, on which there are curves of from 30 to 50 metres radius.

The invention is very old and has long been known in this country. One of the most approved examples is the "Doty-Miltimore compound car-axle," which is now used on several of our railroads. It is stated that 104 patents have already been granted in this country upon car-axles and wheels having the above idea in view, to wit, making car-wheels to run independently.

The Present and Future of Iron

THE following is an extract from a paper read before the American Institute of Mining Engineers, by Mr. E. C. Pechin, President of the Dunbar Iron Company, Dunbar, Pa.

Concerning the future of the iron trade in the United States, there can be but little doubt. The growing scarcity and constantly increasing cost of raw material in Great Britain, their loss of labor by emigration, the social disturbances among the working classes, assuming a more threatening attitude on each new outbreak, the rapidly decreasing value of money, in consequence of the enormous production of gold and silver, combine to forbid any return to former prices, and indicate that a point has been reached beyond which any marked increase is improbable. The same causes are operating to a greater or less extent upon the continent. In the mean while the growing wants of humanity are rapidly outstripping these re sources of supply. In addition to the steadily increasing foreign and home demand, we find, the world over, the most intense activity everywhere displayed in enterprises requiring prodigious quantities of iron. Railways of colossal magnitude are building or projected in Russia, Australia, the East-Indies, North and South-America, and now the hoary and laggard East unbars its venerable portals, and invites, with open arms, the fresher and nobler civilization of the West to renew its life by giving to it what the other, out of its own fertile brain has created.

In the United States, irrespective of the 60,000 miles of road to be maintained, and the 5000 miles annually building, the uses of iron are almost infinite. Day by day the application of iron and steel in new directions and in novel forms is increasing. It is au thoritatively stated that at the present rate of annual consumption, in eight years the forests of Maine will have disappeared. In the Northwest the ravages of fire and the axe of the woodman are rapidly diminishing that source of supply. This growing scarcity of timber is *compelling* the use of iron in buildings—bridges of wonderful size and strength—huge ocean steamships —barges and boats for lake and river traffic—churches—cars, and thousands of minor articles of every shape and size. Thus, looking over the whole field of operations, the present is most favorable, the future most promising. Thus far what has been said applies equally to all branches of the iron and steel business.

What follows is applicable more particularly to the manufacture of pig-iron. That the stocks of raw irons are inconsiderable the world over seems to be admitted. The chances are against any material increase abroad, so that the only matter likely to disturb the home market is excessive domestic competi tion. From the very nature of the business it can only be increased with moderate rapidity. Under the most favorable circumstances it takes a long while to build a modern furnace ; the capital required is very great, allowing only men of large means to engage in such an enterprise. The localities naturally adapted for the business are comparatively few. A still greater obstacle is the time and money needed to open mines and deliver material. Whether the furnaces in existence to-day can obtain full supplies of ore for the ensuing year is by no means a settled question, and, from all the data obtainable to date, the probabilities are against it. The outlook, therefore, is favorable.

But all this may change—excessive prices may check consumption, and a falling off of demand may cause lower prices, and possible loss ; unexpected crises may come, just as they have come before , causeless panics may again unsettle trade. It is, therefore, a duty that each man owes to himself to ward off a disaster by present watchfulness. The American iron master should plan, construct, and manage, as if the barest profit that rewards capital and labor were his ; as if he were assailed on all sides by the fiercest competition at home ; as if he had to seek the market of the world for his living, and find himself opposed to the products of all nations and countries.

Locomotive and Car-Hoist.

THE Montreal *Gazette* gives a description of an apparatus—the invention of Mr. G. N. Nutter, of the Chicago and North-Western Railroad—for shifting trucks from gauge to gauge. The lifter consists of a frame 10x20, placed under the track, with 4 powerful upright screws at each corner, turned by 4 horizontal shafts attached to a bevel cog-wheel on a vertical shaft in centre of frame, which is driven by steam or other motor. Two beams are attached to the upright screws, parallel with the track. The car is run in between the beams ; two bars of iron are run under the body of the car with each end resting on beam ; motion is then given to the centre-wheel, which turns the screws in unison, and in 30 seconds the car-body is raised high enough to disconnect the trucks from the body. The trucks are then attached to an endless chain and are shunted on to a side track, while at the same time another set of different gauge trucks are drawn from another side track by the same chain and placed in the proper position to receive the body of the car, and in less than five minutes from the time the car is stopped the narrow-gauge truck is removed the wide-gauge truck substituted, and the car ready to go on. The difficulty of giving by verbal description an idea of an apparatus such as the one in question is obvious, but we believe that the above will be intelligible to practical mechanics and persons who will read it with care, and that they will be as fully satisfied as to the utility of the contrivance as were those who witnessed its testing. The advantages may be thus summed up : 1. Saving of time—the transfer taking at the outside five minutes, while it is possible to make it in a little over half that time. 2. Enormous lifting power. The machine raised a loaded car, weighing 21 tons, 17 inches in 60 seconds, and the same could have been done as easily with 50 tons. 3. Economy. The motive power can also be utilized otherwise. 4. Enormous saving to branch companies in keeping this running-gear on their own lines, thus insuring a more frequent and thorough inspection, and diminishing charges for repairs.

The Mansfield Machine-Works.

THIS establishment is situated in Mansfield, Ohio, which is the point of intersection of the Pittsburg, Fort Wayne, and Chicago, Atlantic and Great Western, and the Lake Erie Division of the Baltimore and Ohio railroads. The shops are connected with all these lines by tracks running into the grounds, so that the company has excellent facilities for shipping its work in every direction. Being located in the centre of one of the best hard-lumber regions of the West, and near to coal-mines and iron-mills and furnaces, it has unsurpassed facilities for manufacturing cars of the best quality and at the lowest prices.

The shops are three stories high, built of brick, with either metal or slate roofs. The moulding-floor in the foundry covers 12,750 square feet, or 75 x 170 feet. The foundry has three cupolas, with a capacity for melting eighty tons of metal per day. The blacksmith-shop has twenty-two forges, two heavy punching and shearing-machines, and one of Lewis, Oliver & Phillips's bolt-machines, capable of making four thousand bolts per day of ten hours. The machine-shop is 150 x 50 feet, and is supplied with excellent tools, lathes, planers, shaping-machines, drill and wheel-presses, etc. The wheel-press was built by the New-York Steam-Engine Company, and is a double-pump hydrostatic press, capable of exerting a pressure of 150 tons. The axle-lathes and wheel-borer were built by Bement, of Philadelphia. The shafting hangers and pulleys all through the works were made by William Sellers & Co., who have made a specialty of such work. The power is supplied by two stationary engines, one built by the Putnam Machine Company, of Fitchburg, Mass., and the other in the shops which we are describing. Two of the main buildings have steam-elevators for hoisting different parts of cars.

The wood-working machinery is quite equal in quality to the other tools, and consists of one of Fay's arge planers for planing car-sills on four sides at one time, a smaller one for dressing flooring, roofing, sheathing, etc., one mortising-machine, and a "universal shaper," of which we have received a photograph and expect to publish an engraving soon, and therefore reserve our description until that time. This machine is manufactured by the Mansfield Machine-Works, which has already supplied many shops with them The wood-shops are also supplied with a full equipment of "rip" and "cut-off" saws, boring-machines, and all the other requisite tools.

This company employs about 250 men. It commenced work on cars in May of last year, and has built since then 200 box grain-cars for the Baltimore and Ohio Railroad, 130 coal and 100 gondola-cars for the United States Rolling Stock Company, 50 hopper coal-cars for Brown, Bonnell & Co., 50 stock-cars for the Pittsburg, Fort Wayne, and Chicago Railway, 50 grain-cars for the Peru and Indianapolis road, and is now at work on 200 box grain-cars for the Erie road.

The order for the cars for the United States Rolling-Stock Company was contracted to be filled on the 1st of October. On the 30th of September, the last of them were turned out of the shop. The order for the Baltimore and Ohio Railroad was filled with equal promptness.

The officers are Mr. H. Colby, President ; E. Sturges, Sr., Treasurer ; E. H. Rees, Superintendent ; A. L. Grimes, Secretary.—*Railroad Gazette.*

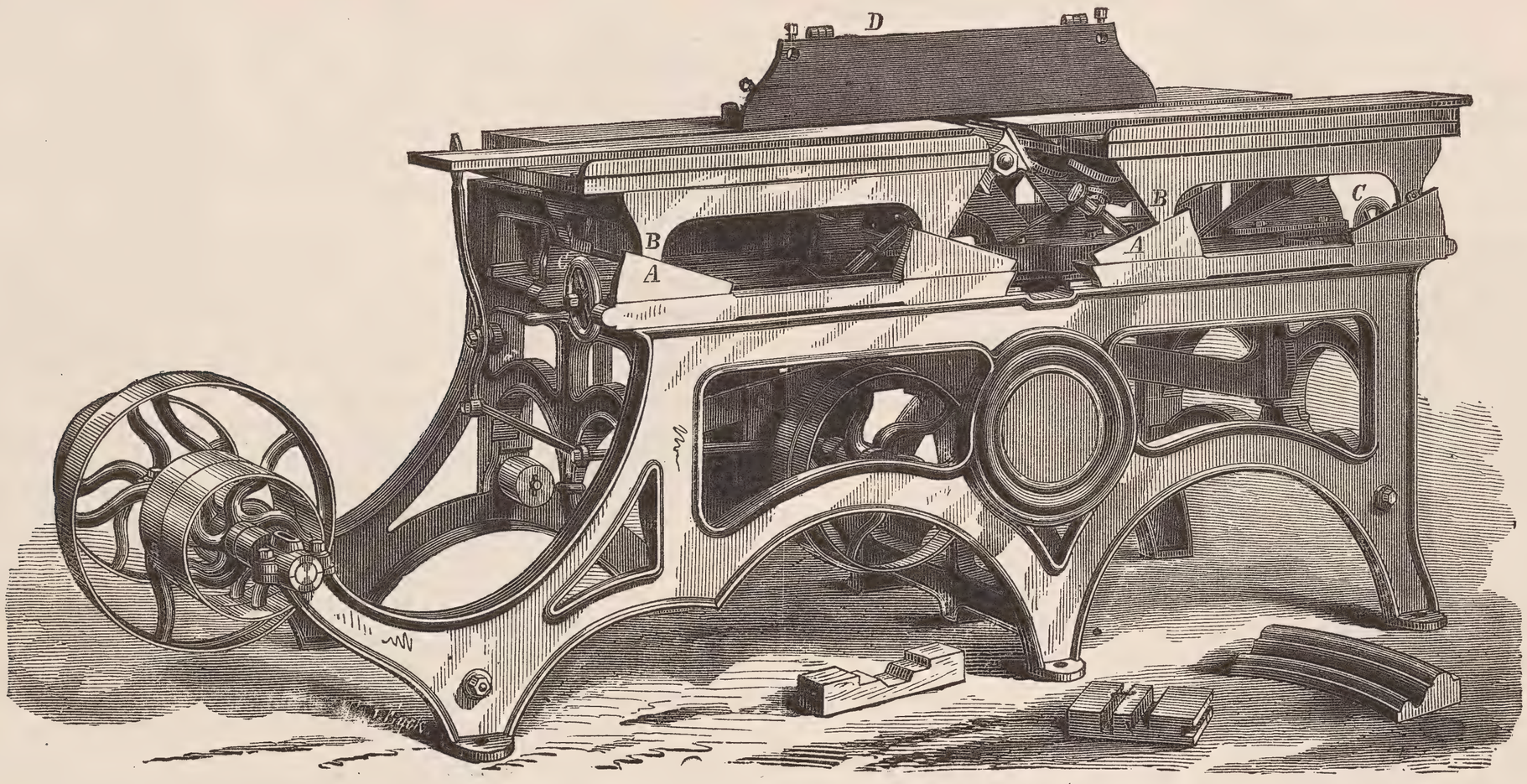
A Model Railroad.

A CORRESPONDENT of the New-York *Sun* indulges in the following pleasant strain of exaggeration about a certain road on which he recently traveled :

"It is thirty-six miles long. I rode on it, and those cars moved so slow that if you want the draught in your face you have to ride backward to get it. They never have hot journals on that road ; the great danger is, the stuffing and gravy around the axles will freeze. The screech of the locomotives is very faint, kind o' like the warble of a four-year-old boy blowing through a knot-hole in a board fence. It is capable of giving a grasshopper a thrill of alarm, but won't scare a cow worth a leather cuss. The conductor, engineer, and fireman always walk ahead of the train to look for broken rails, and the cows always run ahead of them to keep out of the dust. I tried an experiment. Two trains were passing, and I stuck a match out the window and let the head of it rub against a passing car. It went so slow I couldn't strike a light. If you ever take a trip over that road, you want to take lots of clothes, a whole ham, and a barrel of corned-beef along with you."

Improvements in Street-Cars.

MR. JOHN STEPHENSON, the well-known street-car and omnibus-builder of New-York City, whose passenger vehicles may be seen in nearly every country on the globe, has recently received patents for various improvements in their construction, which consist as follows : The first invention relates to securing the metallic connection between the running-gear and the body of the car, which is accomplished by interposing rubber or other elastic material between the parts, so as to reduce the discomfort experienced by passengers from the noise of the wheels, the clattering of the parts, and the jar occasioned by applying the brakes. The next improvement consists in making the axle-journal without a shoulder, and placing a spring-check at the end, by which arrangement, as the car is forced from side to side through inequalities in the track, the concussions are relieved by means of the spring-check. The third invention provides means for securely holding and fastening the caps of car-axle journal-boxes, and the fourth improves the construction of car-brakes, so as to simplify the same and facilitate repairs.



Improved Universal Wood-Working Machine.

THE cut illustrates one of the most useful and effective labor-saving machines which modern invention has produced. As its name implies, it is adapted to every kind of wood-cutting required in the manufacture of cars, carriages, furniture, sashes, blinds, doors, etc. It is made entirely of iron and steel. To convey an idea of the variety of work to which it may be applied, we need only to mention the following, namely: squaring, planing out of wind, beveling, cornering, rabbeting, gaining and plowing, planing tapered sticks, gaining 4½ inches in width by 3½ inches in depth (done at one cut) gains cut so close to others as to leave only a mere film of wood between them, plowing and gaining with the same cutter-head, gaining at different angles, glue joints of newel-posts, mitering, tongueing, and grooving, rolling joints, table-leaves straight moulding, (several specimens in hard and soft wood,) circular and elliptical moulding, raised paneling, (the panel being raised on both sides of the piece at one operation,) journals for agricultural machinery, picket-pointing, gaining cuts made at one operation for journal boxing of different shapes, routing for bed-post irons, window-sash, light moulding, etc.

This enumeration, however, does not comprise all. There is hardly a shape in which it is desirable to form wood in car or carriage-building or furniture-manufacturing, which is beyond the limits of its capacity. The machine has a "sticker" attachment to plane one, two, three, or four sides at one operation, so that it may be run with five heads, one of them on the front side, and four on the sticker side for the various purposes to which a "sticker," or moulding machine is applicable.

The vertical adjustment of the tables is shown in the cut, and is accomplished through the action of inclined planes A simultaneously and equally moved by hand-screws C. Upon these planes rest the inclines B which support the table. D is the fence made of iron, and capable of adjustment to any angle with the table. It will be seen that there are two independent tables, one on each side of the cutter-head, so that the piece to be planed rests on a solid surface on each side of the cutter-bits, and is thus planed out of wind. By adjusting the fence properly, any bevel may be planed.

The advantages claimed for this machine are the great variety of work it will perform, the ease with which it can be adjusted, the accuracy of its performance, its strength, durability, and simplicity, its capacity to take the place of several distinct machines, (while costing far less than the several machines whose place it fills,) its power to plane light or heavy stuff out of wind and finish it at the same operation, and the economy of bench-work it accomplishes.

By changing the heads of the machine, it is readily adapted to the kind of work required, thus obviating the necessity of carrying the material to different parts of the shop to be worked.

The machine has been used with great satisfaction in some of the best shops in the country, some manufacturers having purchased several of them for the same shop, after a trial of one. The large number of testimonials submitted to us are sufficient proof of its merits. Of the numerous railway-car shops and regular car-manufacturers that are now using it, we may mention the Pennsylvania and Michigan Central railroads, which are using three machines each; also the Pittsburg, Cincinnati, and St. Louis; Louisville and Nashville; Louisville, Cincinnati, and Lexington; Grand Trunk of Canada; Indianapolis, Cincinnati, and Lafayette; Chicago, Alton, and St. Louis; also the Barney and Smith Car-Works at Dayton, Ohio; Detroit Car-Works; Ohio Falls Car-Works at Jeffersonville, Ia.; McNairy, Claflen & Co., Cleveland; Litchfield Car-Works, and four several car-manufactories at Wilmington, Del. Messrs. Barney & Smith say that any one of the three machines they have purchased, paid for itself in the first four months of its use.

The machine is covered by several patents. For purchase of rights or machines, address Messrs. McBeth, Bentel & Margedant, manufacturers, Hamilton, Ohio, whose advertisement will be found on the 18th page.

Art in Metal-Work.

WE have often remonstrated against the incongruous character of our metal-work. Here there is a comparatively untrodden path of art. Cast and wrought-iron work are extensively employed in building. These are as capable of artistic treatment as the brick or stone building with which they are incorporated. Generally, however, they are either covered up, or else made in the forms of stone architectural features, as though metal was something to be ashamed of; as though it had no properties that did not suggest life and beauty in artistic design, allowing the metal to appear, and making its use, strength, and appearance forcible; marking and emphasizing it in the building; and, instead of hiding it, or making it appear like some other material, giving it a definite design and character of its own. Thus, by its force and contrast, it would very greatly add to the effect of the building where it was employed. There is no exception in the case. All kinds of purposes for which metal is used in buildings might be marked and emphasized by artistic treatment. How much less of sameness and tameness would there be if this were done! and how much greater would be the artistic feeling and force!—so very desirable. There is great scope here; and, until more is done in this department, there is something wanting here.

The employment of zinc for external cornices and canopies is coming into vogue. Setting aside the question of durability, why is it not possible to treat the material artistically as metal? What is the necessity of making it appear like stone? Even with a design resembling the treatment of stone, it looks far better with its glossy, natural color as metal than when smeared and deadened with paint not at all in accordance with its nature.—*The Architect.*

New Depot at New-Haven.

THE new structure will be 600 feet long, and wide, enough to admit of six tracks passing through the centre, with spacious platforms, waiting-parlors, baggage rooms, ticket-offices, and the like upon the sides. In the second story of the building will be the rooms of the superintendents and other officers of the roads. The main track of the New-York road will remain as it is, and with this and the other roads the arrangement will be to run the reight-trains outside of the building, and the design in general will be to do the coupling and shifting of cars, as far as possible, outside of the building, keeping it free from the continual passing to and fro of engines and empty cars, and reserving the tracks within exclusively, if possible, for the regular passenger-trains. By this means it is expected to remove many of the dangers to which passengers and others are exposed in the present depot. The new building, too, will be long enough to render accessible all the cars of long trains, and it will not be necessary, as is now the case, to fill a few of the cars and then move ahead two or three times to bring the others within reach.

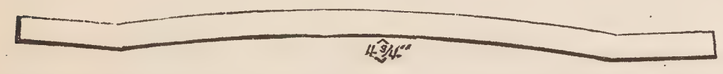
The work will be vigorously prosecuted during the winter, and Superintendent Reed expresses the opinion that there will be very little grass growing in the neighborhood before the walls are up, and by the middle of the summer he expects the work to be completed. The building will be of brick and stone, and under ordinary circumstances fire-proof. It will be built by the New-York, New-Haven, and Hartford Railroad, but used as a union depot by all roads leading into New-Haven, the companies paying reasonable rent to the builders.

The Truss-Plank.

BY W. E. PARTRIDGE.

THE piece of timber in railroad-cars known as the truss-plank is one of the most important of the many pieces used in the construction of the ordinary passenger-coach of the long or saloon pattern. Extending, as it does, the entire length of the car, and being firmly screwed to the posts and side-sills, it can be made to contribute very materially to the strength of the vehicle, both in ordinary service and in the contingency of accident. In the position it occupies, its chief duty is to hold the car up and prevent it from breaking its own back, or "getting down in the centre," as it is called. As a general thing, it adds greatly to the lateral strength of the posts, and consequently to the walls, which, without it, would have little more than the strength of the tenons and the screws holding the panels to the sills. In a butting collision, the end area of the truss-planks offers a very great resistance, and when they are made of the best and strongest timber, this resistance may be nearly equal to that of all the central sills combined, especially when the latter are not of hard or Southern pine.

The plank most generally used is a piece of pine 12 inches deep, and from 2½ to 2¾ inches thick, got out "crowning" ½ to 2 inches, the length always corresponding to that of the car, whether 48 or 55 feet. In this practice there seems to be a manifest defect. If a 12-inch plank is a suitable size for a 48 foot car, it is reasonable to conclude that a deeper or heavier plank is required for a car of greater length designed to carry a heavier load, and weighing, when light, several thousand pounds more. For a car containing 68 or 72 seats, a plank 15 or 16 inches deep is none too small. The only objection to such a width is the general practice of resting the end of the seat-frame on the edge of the plank, and for this reason, its depth rarely or never exceeds 12 inches. The seat-frame should be made shorter, and rest *against* the plank and not on it. This method is employed by Mr. Smith, of the Erie shops, at Jersey City. Nor is this plan objectionable as applied to standard-gauge cars. Mr. Richardson, of the Boston and Maine Railroad, at Lawrence, Mass., uses a 15-inch plank, 3 inches thick, in all his cars, which are of the standard 4 feet 8½ inch gauge. Its form is represented by the cut. It is 4¾ inches "crowning" in the centre, and, when

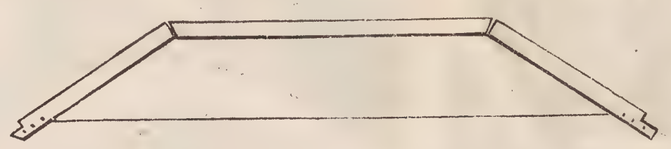


put on, is bolted down to give a bearing the whole length of the sill. By this means all the fibres are brought into a state of tension to resist breaking down. Turning up the ends from the transom toward the platform prevents the end of the car from getting down. This may seem an extreme case, but practically it is just what is wanted.

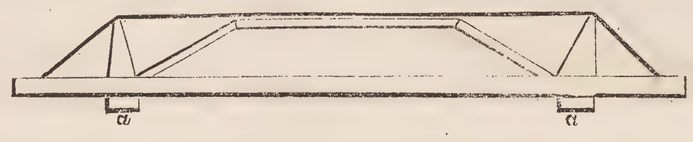
On the Rome, Watertown, and Ogdensburg Road, Mr. Sessions, the master car-builder, is employing a very different plan. The truss-plank is of the usual thickness—about 3 inches—but is only 6 inches deep. It is raised its own width from the floor, to allow a trunk for warm air, with registers at every seat, to pass along beneath it. The plank is fastened to each of the posts by two lag-screws. The trunk itself adds somewhat to the stiffness of the car. The top of the plank is 12 inches from the floor, and the seats rest upon it. By springing the plank into place, and securing it so as to get its full strength in an arched form, this might be made a very good style of construction. Mr. Sessions builds a very light car, and takes unusual care in gluing fast every joint in the walls and framing, and when it is put together, it is jacked up in the centre, so as to bring every joint to a firm bearing when supported at the ends.

A drawing-room car was built last winter by Mr. Adams, at the Boston and Albany shops, at Springfield, in which he substituted for the ordinary truss-plank an arch of ash, springing from the transoms, and sweeping up to the window-sills at the centre of the car. Upon this the braces and posts were halved and secured by screws. This arch-timber was 1 inch thick and 5 inches deep, and was secured to the sill by rods which clasped over the top, and could be tightened by nuts underneath. Some who have tried this method of construction have condemned it very decidedly; but the truth seems to be that the failure of cars built on this plan might have resulted as much from faulty construction as from faulty design. As applied by Mr. Adams, the wall of the car became in effect a *framed truss-plank* from window-sill to floor.

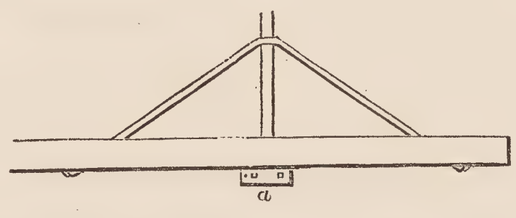
Mr. Milton Sessions, of the Vermont Central road, is building cars with a truss in their walls, a method which has proved very satisfactory. The form is shown in the drawing. Instead of the usual braces



between each post, held down by rods from the sill, an iron strap runs from the transom over a casting along the top of the wooden brace, and down at the ends, as shown in the cut; *a a* are cast-iron braces,



over which the rod passes. Two bolsters are used at each end of the car, only one of which is shown in the diagram. In some shops, another iron brace is added over the bolster to hold up the end of the car, *a* representing in this case the transom.



It would require much experience with both kinds of cars, and a careful study of the details of construction, to decide positively as to the merits of this plan as compared with that of the ordinary brace and rod. A well-built car of defective design frequently outlasts one of the very best design but poorly constructed; and this fact must be kept in mind in estimating the value of any given plan.

In Mr. Osgood Bradley's shops, at Worcester, Mass., and in some others, the plank is fastened to the posts by wood-screws. Mr. Bradley uses No. 26 screws, about four inches long, and in some cases No. 20 are used. The most general practice is to use two lag-screws in each post; and, all things considered, this plan seems to secure the greatest strength. Halving the plank on the posts, as it is called, adds very much to the strength of the car-wall, provided it is carefully done; otherwise, the strength of the plank is impaired more than that of the wall is increased. Half an inch is the usual depth that the posts are let into the plank. The advantage of this arrangement, however, depends very much upon the method of securing the posts to the sill. If, as is the case in too many shops, they are simply set upon the sill with a tenon and held by a pin, it becomes almost imperative to halve the plank to the posts, in order to give the latter all the strength possible. In these cases, the strength of the posts is only equal to that of the tenon, and, in some cases, only as great as to be equal to the force required to pull the pin through the end of the post. The best method seems to be to bolt the posts to the outside of the sill. When this is done, there is little or no danger that the bottoms of the posts will rot, as the space between them can be left open at the bottom, so that the air can circulate in the wall. Cars built in this way show very light repair-bills, and have proved very strong in cases of accident.

Holding-down bolts for the truss-plank should be made of the very strongest material, in order that their size may be a minimum. Every bolt-hole in a stick of timber weakens it, and the larger the hole the greater the weakness. Every stick in a car having a load to sustain or a shock to resist, should be cut as little as possible, and the grain of the timber should run from end to end. Cracks are extremely liable to start from bolt-holes and mortises. When a piece of timber is subjected to a heavy strain, a mere score across the top with an ordinary pocket-knife has been known to start a crack that ruined it for the purpose for which it was designed.

Denison's Lubricating Compound.

WE notice, in some of the railway and mechanical journals, deservedly high commendations of this article, illustrated by a cut representing a hot box in a complete state of combustion. We omit the cut in our present notice as quite superfluous. Hot boxes are such a chronic nuisance in operating railroads, that the mere mention of them will enable practical railroad mechanics to form a much more vivid conception of what they are and how they look, than they would be able to with the aid of the most graphic pictorial representation. Even those who have not what is called a "mechanical turn of mind," know what a hot box is, provided they have ever seen a railroad track, single or double, wide or narrow gauge. They also know that the cause is friction, and the cure lubrication; that an axle-journal revolving as rapidly as a sleeping-top, with a weight of ten tons resting upon it, necessarily produces friction, which, if not constantly obviated by some lubricating appliance, will produce a miniature Vesuvius in active eruption, and in a very short space of time. So much by way of apology for not getting an engraving made to show our readers what a hot box is.

The efficacy of "Denison's Cooling and Lubricating Compound" in preventing hot boxes, or in speedily cooling them off when they are hot, is vouched for by many engineers and master-mechanics; and the testimonials to this effect that we have seen are such as to leave no doubt on our mind touching the merits of the article. It has one peculiarity which should be specially noted. When applied to a heated journal, the latter begins to cool at once, although it is kept running at the same speed that caused it to heat, so that the compound cools and lubricates both.

Mr. O. K. Ford, superintendent of machinery and pasenger-car department at Marshall, (Central Railway of Iowa,) writes, under date of July 12th, 1872, that he used this compound on a box under one of a fast line of passenger-cars which came into Marshall smoking hot. He had the box, without cooling, re packed with this compound. The car was then run twenty-six miles in thirty-three minutes without making a stop, and at the end of the run was perfectly cool. He adds his conviction that the compound is a perfect success, and avows his intention to adopt it for the road.

This testimonial is no more favorable than many others of equal authority from which we forbear to quote. The most flattering testimonials have also been shown us from owners, engineers, and superintendents of mills employing heavy shafting at high speeds.

The compound is manufactured by Post & Kalkman, dealers in machinists' and railroad supplies, 111 Liberty street, New-York, whose advertisement appears on 20th page.

A CEMENT of great adhesive power may be made by rubbing together, in a mortar, two parts of nitrate of lime, twenty-five of water, and twenty of powdered gum arabic, this forming a transparent cement of wonderful strength, and applicable to wood, porcelain, glass, and stone. The surfaces to be united should be painted with the cement, and firmly bound together until the drying is complete.

COLORATION OF WOOD FOR VENEERING.—To make the color penetrate the wood thoroughly, it is necessary to soak the woods for 24 hours in a solution of caustic soda, and finally boil them for half an hour; on being washed and dipped in the color-bath for 24 hours, they take the color all through.

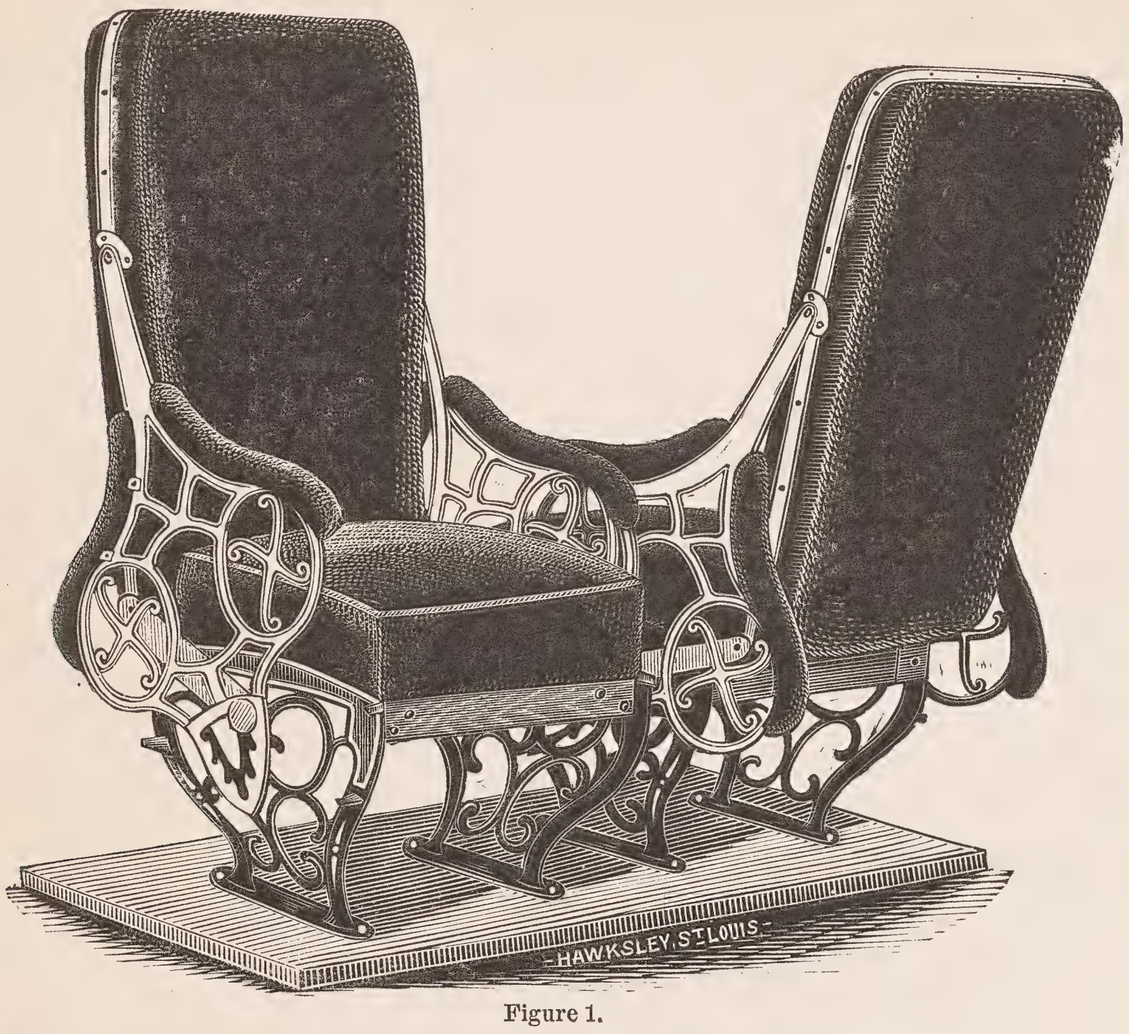


Figure 1.

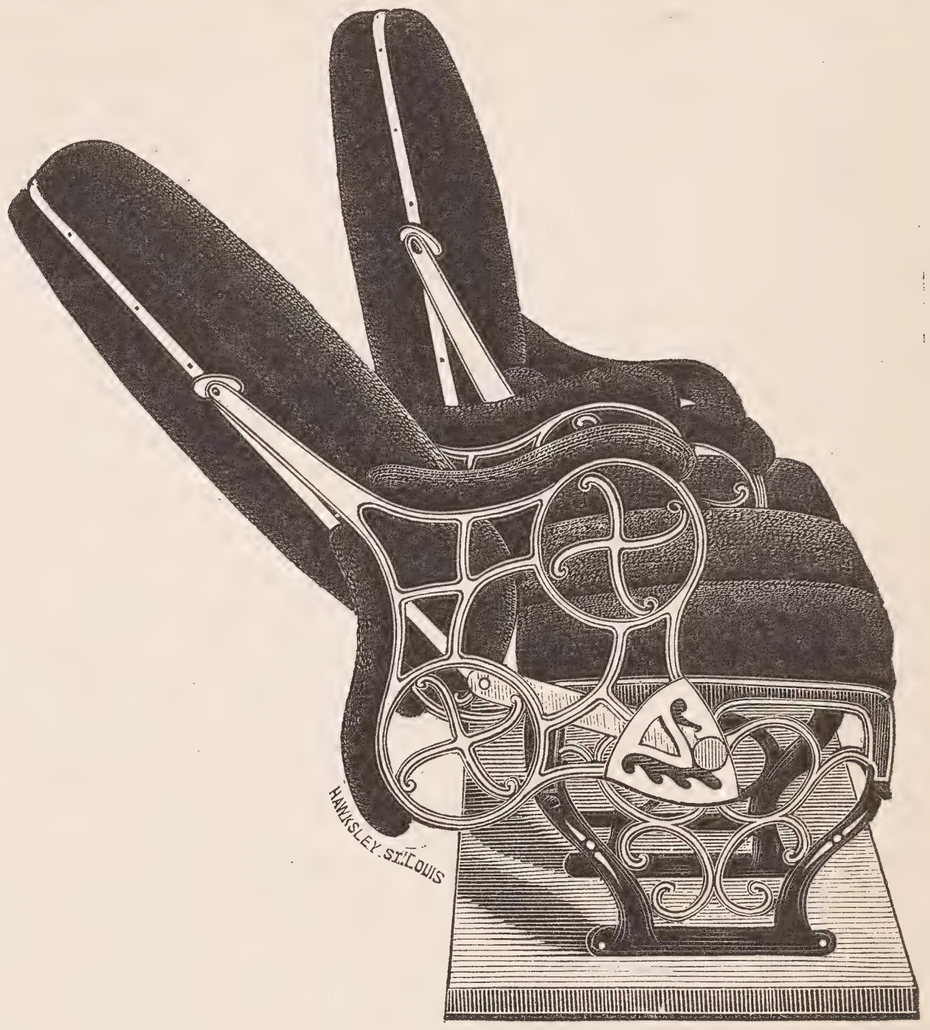


Figure 2.

Improved Adjustable and Reversible Seat for Railway-Cars.

IT would be a great boon to the traveling public if the ordinary reversible-back passenger-car seat could be rendered capable of further transformation, so as to allow the occupant to change his position and relieve the weariness and monotony of an erect posture. This the ordinary car does not permit him to do, exe cept to a very limited extent, unless he is fortunat enough to secure and retain a double seat, and even then the unfilled space between the seats renders his position untenable for any great length of time. The vast number of local travelers on our railways, including invalids and those who spend but a part of the night on a train, or who feel unable to pay for the luxurious accommodations of palace sleeping-cars, would be greatly benefited by an adjustable seat so con. structed as to be easily controlled by the occupant It would afford them much welcome rest by day and night, without the expense and trouble of engaging a berth. To assume that this large and constantly increasing class of passengers should not have every reasonable provision made for their comfort, is about the same as to say there should be no second-class hotels. Improvements of this kind would not supersede or materially encroach on the province of sleeping-cars. A great many trains do not have these; and to add to the comforts and conveniences of day-cars would tend to lessen the difference between the two classes of cars, which is now so manifest as to provoke unfavorable comment as establishing an artificial distinction in the classes of passengers, so obnoxious to democratic ideas.

The engravings represent an improved adjustable and reversible seat, designed for the ordinary day-car, and so constructed that it can be changed at the pleasure of the occupant into a reclining-chair or couch. Figure 1 is a perspective view of a pair of these seats, the backs being so adjusted that the persons can sit face to face in an upright position. Figure 2 shows a side elevation with the backs at different inclinations. To change the back from an upright to a reclining position, the sitter rises from his seat, and pulling the arm-rests toward him, the back drops into position at a greater or less inclination as may be desired, where it is held by the pivot-pin which fits into either of the several notches as shown in the engravings. It can be placed in an upright position again by a slight pressure forward on the arms, which detaches the notch from the pin, causing the arm to drop downward until it falls into the proper notch. Each chair is, of course, independent of the other, so that each person can suit himself as to position, while no more space is occupied by the seat than by the old style, and the cost is no more than for a first-class car-seat. They can be made of any width to suit any gauge, or can be placed in cars now using the ordinary seat. A car 50 feet long, 10 feet wide, and 9 feet 6 inches high, on the St. Louis, Kansas City, and Northern Railroad, has recently been furnished with these seats, and is making regular trips. The car contains 49 chairs, besides commodious saloons and toilet-rooms. The distance from centre to centre of seats is 38 inches, which affords room for the action of the chair without interfering with passengers before or behind. Wooden frames are suspended under the seats for foot-rests, and are raised or lowered by means of iron supports that work in ratchets fastened to the floor. They are arranged so as to be used by children as well as grown persons, and in this respect are superior to any similar device. The ease with which the seats are adjusted and controlled, their simplicity of construction, and the comfort derived from them, are attested by every passenger who has tried them. They are by no means clumsy in appearance, but, on the contrary, add very much to the elegance and pleasing effect of the interior of the car. Other cars are being fitted up with them on the above-named road, and applications for their use have been made by other roads.

Full sets of patterns can be furnished, information as to the right to use the chair, or the chair itself can be obtained on the most reasonable terms, by applying to C. S. Buck or James Lovett, St. Louis, Kansas City, and Northern Railroad, St. Louis, Mo.

English Railways.

A RETURNED European traveler makes the following comparison between English railways and our own; but we think few of our people will agree with him in his estimate of our palace coaches. He says,

"It is characteristic of the English prudence and plain-dealing, that they put so little on the cars and so much on the road, while the reverse process is equally characteristic of American enterprise. Our railway system, no doubt, has certain advantages, or rather conveniences, over the English; but for my part, I had rather ride smoothly, swiftly, and safely, in a luggage-van, than be jerked and jolted to destruction in the velvet and veneering of our palace-cars. Upholster the road first, and let us ride on bare boards until a cushion can be afforded; not till after the bridges are of granite and iron, and the rails of steel, do we want this more than aristocratic splendor and luxury of palace and drawing-room cars. To me there is no more marked sign of the essential vulgarity of the national manners than these princely cars and beggarly clap-trap roads. It is like a man wearing a ruffled and jeweled shirt-front, but too poor to afford a shirt itself. Their locomotives are less noisy than ours, having a shrill, infantile whistle that contrasts strongly with the loud demoniac yell that makes a residence near a railway or depot in this country, so unbearable. The trains themselves move with wonderful smoothness and celerity, making a mere fraction of the racket made by our flying palaces as they go swaying and jolting over our hasty, ill-ballasted roads."

English Saloon-Car.

A NEW saloon-car built at the Brighton Railway Company's carriage works is thus described in the London *Railway News*:

"The exterior of the carriage is of mahogany, with teak bearing-frame; the door-handles, beadings, etc., of silver-plated metal perfectly plain. The main portion of the carriage embraces two portions, which have two full-length couches on each side. One half of the saloon has a folding cloth-covered table to be used for any purpose the travelers may desire. At one end is a central door that communicates with the servants' compartment, which has accommodation for five persons in one seat across the carriage. Passing from this again, there is a compartment that, in the event of there being but little luggage, would pass muster very well as a smoking compartment, a wide folding seat being provided. At the opposite end of the saloon is the dressing closet that is tastefully fitted. The saloon has its wine-cellar and plate-box, fitted under the seats, with accommodation for a very long journey. Some ordinary first, second, and third-class carriages are in process of building for the South-London line, where they are much needed; and when put on the line, these trains will be the most elegant and commodious in London. All the three classes are of one length and height, and, including the third-class carriages, glazed uniformly. The exterior and ends are of mahogany, well dressed and brightly varnished. The side-bearing rails of the frames have steel plates, to give more room in the carriage, with equal or greater strength in the bearers."

Car-Shop Notes.

PITTSBURG, CINCINNATI, AND ST. LOUIS RAILROAD CAR-SHOPS AT STEUBENVILLE, OHIO.

RAILROAD men and the traveling public generally are doubtless quite familiar with what is called the "Pan Handle" route or short line from New-York and Philadelphia to Cincinnati, so much so, at least, that some account of the mechanical department of the road, and especially the portion of it devoted to car-work, will be of interest to our readers.

The car-shops are located at Steubenville, on the Ohio River, about forty-three miles west of Pittsburg. The road crosses the river at this point by a magnificent iron bridge, the first railway-bridge erected over that stream. The general arrangement of the shops, as is the case with many others, is the result of a steadily-growing business, and not of any original preconceived design. When the road was in its infancy, the building now used as a paint-shop constituted the car-shops entire, and those now used for car-shops were then the locomotive machine-shops and round-house. With all the additions that have been made to the car-department within the last five years, the works are at present quite inadequate to meet the requirements of the road. We are informed that the company intend to begin, in a few months, the construction of extensive car-works at Dennison, which is the present location of the machine-shops, and is half-way between Pittsburg and Columbus. The new works will be equal to the present wants of the road, with a liberal margin for the future increase of its business.

The present car-equipment consists of 34 first-class coaches, 19 baggage, mail, and express cars, 1600 freight-cars of all classes, 44 caboose and 4 tool cars, besides one directors' coach and three sleeping-coaches which were built at the Steubenville shops. About ten Pullman palace-cars pass over the road each way daily. The present capacity of the car-department is three freight-cars per day, and six coaches per year, besides keeping up necessary repairs. All the bridge work is also done in this department. The average force employed is 200 men.

At the time of our visit to these works, a few weeks since, there were two coaches in the paint-shop nearly finished, and two others nearly ready for the painters. These vehicles have many points calculated to attract the attention of a connoisseur in car-construction, and without assuming for ourselves any such skill in criticism as the name implies, we can not refrain from noticing some of the features to which we allude. They are 49 feet 8 inches long, exclusive of platforms, 9 feet 7½ inches wide, and 9 feet 4 inches high from floor to centre of dome-ceiling. The bottom framing contains six longitudinal sills. The plates are put on with the edge up and down, which gives room for the sash to slide clear up to the roof-boards. There are eight principal carlines of iron, ⅝ by 2½, with wood riveted on each side, and each carline dovetailed to the plates. A continuous window-stool is used, the panels are put on up and down; at the bottom edge is a band of ⅛ by 1-inch iron let in flush with the wood and fastened with screws. This is very useful, as it saves the body from many hard and damaging knocks which it would otherwise receive. The dome-roof is 17 inches above the body-roof, and the short carlines from the plate to the dome are perfectly straight instead of being curved. The ends of the roof are straight across, thereby excluding smoke and cinders to a great extent. The outside finish of the car-body is not gaudy or flashy, nor yet excessively plain, but may be described as a happy medium between the two and displaying good taste.

In regard to the interior, there are many things worthy of remark. The way the roof is formed first demands attention. The space or distance between the inside of the dome and the sides and ends of the car is the same all round; therefore the inside cornice mouldings and head-linings are carried across the ends of the roof on a straight line, the same as along the sides, which would be understood by car-builders as "returning the head-work." This makes a very pretty finish, and when once seen never fails to please. The car contains but one saloon. The window-openings are 22½ by 28½, with oval tops and only one sash. In the cars built last, the sash will have a stop when only 7 inches high, the object of which may require a little explanation. The sash may be raised to its full height, but the motion of the car will naturally cause it to slide down to the stop, at which height the air admitted will not incommode the occupant of the seat behind; but if the sash remained at its full height, the back seats would receive the air and cinders to a greater extent than the one by the window. The panel-work is veneered with French walnut, which gives it a rich but rather dark appearance. This, however, is relieved by bay-wood mouldings, which afford an effective and beautiful contrast. A very neat leaf-shaped turnless moulding finishes the point of the oval between the windows.

Dripps's patent heater is used, but an improvement is introduced in the manner of distributing the heat which is worthy of mention. Under each seat is an inverted trough, one end of which is attached to the heat-conductor just on the aperture, by which arrangement the radiation does not at once come in contact with the sitter so as to be oppressive, but is more evenly distributed. The great objection to this heater is, that the register is too much under the control of the passengers. We have been in cars on very cold days when nearly every register would be closed because the passengers sitting near them felt the heat too strong on their feet, while the rest of the passengers would be complaining of cold. This trouble is avoided by the method referred to, and which we believe originated with the master car-builder of these shops.

Much has been said about the uncomfortable seats which are found on many roads, but we do not think the most fastidious can find any fault with those made here. They are 17½ inches wide, with serpentine back, considerably higher than the ordinary back, and upholstered in the style of an easy-chair. The traveler sits in them as comfortably as in his own parlor arm-chair, if not a little more so. The trucks of the two coaches last built will have six wheels of the Pennsylvania Central pattern. This is what all roads will doubtless sooner or later come to. In the matter of cost, the four-wheel truck has the advantage; but when looked at from the stand-point of comfort and safety, the result is highly favorable to the six-wheeled truck. The entire cost of these coaches does not exceed $5000.

The management of these shops is worthy of unqualified praise. Mr. James McGee is the master car-builder, who came here ten years ago and commenced work as a journeyman; but by his industry, perseverance, and capacity, has been promoted to his present position, and ranks among the best car-builders in the country. He has competent assistants in every department. Mr. James Copeland is foreman of passenger-work; Thomas Furgerson, of freight-work; Edward Elliott, (the oldest employee on the road,) of the blacksmith-shop; C. L. May, of the paint-shop, and last but not least, Stewart McBeth, the boss of the ink-slingers, as he is humorously termed by the shopmen.

THE INDIANAPOLIS AND ST. LOUIS RAILROAD SHOPS, AT MATTOON, ILL.

The prosperous and growing city of Mattoon is situated on this line of road, about 128 miles from St. Louis and 132 miles from Indianapolis. Within the last three years, there has been much active competition among the several towns along the line for the location of these shops; but the liberality and enterprise of the citizens of Mattoon in donating the handsome sum of $60,000 toward their erection decided the point in their favor, and the work of erecting the various buildings was begun and rapidly prosecuted.

The round-house was first completed, and contains 30 stalls for locomotives, with a very fine Sellar's turn-table. The distance from wall to wall, or length of the stalls, is 62 feet, and the circumference of the entire structure 905 feet. The roof is slate, and contains iron ventilators over each stall. Four steam heating-pipes are placed around each of the pits and along the walls, by which a comfortable temperature is secured. All the running and incidental repairs of locomotives are here made, every one being carefully inspected after a trip and kept in perfect order, this being as indispensable to an engine as rubbing and feeding are to a horse. The stalls are seldom empty, owing to the increasing business of the road and the active service required of the locomotive rolling-stock. This department is under the efficient management of Mr. W. Goss. The force employed, including engineers, firemen, and the various subordinate grades, is 132 men.

Adjacent to the round-house is the coal-house, a building capable of holding 30,000 bushels of coal, and supplied with a hoisting apparatus for lifting the coal to the level of the engine-tender, into which it is dropped from a tub, the tubs holding a ton each, so that a correct account can be kept of the quantity used by each engine. Near by is the tank-house, a two-story brick building, 36 x 36, the upper story containing four tanks holding 60,000 gallons, and supplied with water from the company's reservoir about two miles distant. Steam power is used for the purpose. The lower story is occupied with oil, waste, and other combustible stores.

The boiler-shop for repairing locomotive boilers is a brick building 50 x 80. It is supplied with its own steam-power, and contains three tracks and two erecting-pits. A force of 13 men is here employed, under the direction of Mr. John H. Filcor, an experienced boiler-smith. The blacksmith-shop is also of brick, 50 x 150, and contains 15 fires and a large steam-hammer. In the roof are three ventilators of the ordinary Venetian style. The shop is in charge of Mr. Donald McDonald, and employs 35 men, who differ somewhat from the average politician from the fact that they are men of more blows than words. Contiguous to this shop is the iron and steel house, a frame building 40 x 50.

The transfer-table runs in a pit with a double track. Parallel with this is the locomotive machine-shop, a brick building 110 x 204, containing seven pits, all of which were occupied at the time of our visit to the shops by locomotives and tenders undergoing repairs or being rebuilt. This building also contains a well-selected variety of iron and wood-working machinery, embracing axle-lathes, bolt-cutters, drill-presses, planing, boring, matching, cutting, and other machines and appliances usually found in similar establishments. Ninety men are employed in this department. The general store-house is a building 40 x 60, and is in charge of Mr. H. C. Watson, who is peculiarly fitted, by long experience and attractive personal qualities, for the responsible position he fills.

The car-shop proper is 44 x 228, and is the last of the brick buildings erected. In it are the tool and upholsterer's rooms and master car-builder's office. It contains six erecting-tracks capable of holding two cars each; also a number of wood-cutting machines of the latest and most improved patterns, and well adapted to turn out work with economy and dispatch. Both freight and passenger-cars are here built and repaired, an average of fifteen of the former class being received, repaired, and dispatched daily. This department employs a force of 100 men.

A frame building is used as a receptacle for castings and patterns, which are classified and arranged so as to be readily accessible. The paint-shop is a frame building 44 x 228. At the time we were in it a Pullman palace-car was receiving its finishing coat of varnish, having been completely rebuilt by the railway company, and we hazard nothing in saying that a finer looking or more elegantly finished coach of its class is not to be found on any of the Western roads. About 17 hands are employed in this shop.

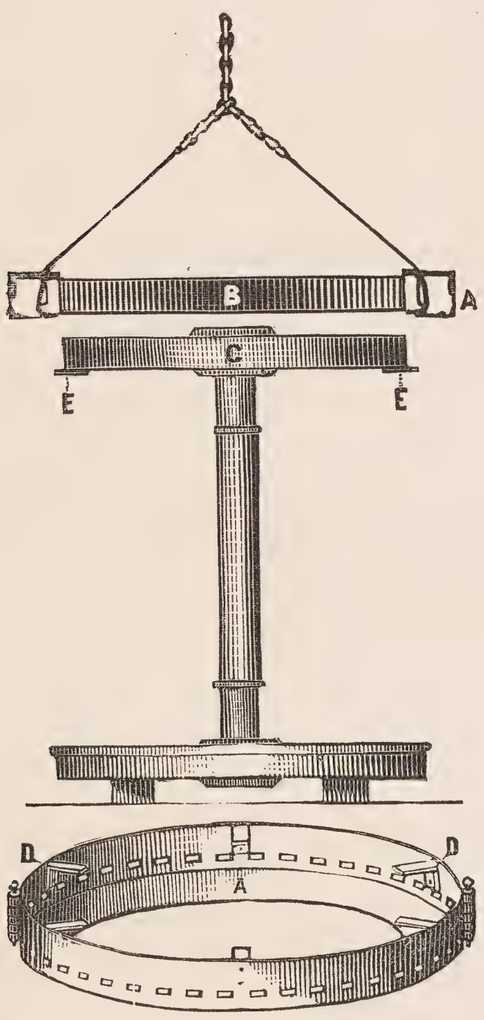
The average annual cost of labor per man in the several departments is estimated as follows: Locomo-

tive machine-shop, $789.90 ; car-shop, $592.44 ; paint-shop, $675.84 ; employees in round-house, $337.24.

The locomotive department is under the superintendence of Mr. William Barkla, the master-mechanic, and the car-building department is under the direction of Mr. Robert B. More, the master car-builder, both being gentlemen of practical experience in the business of their respective departments, and well qualified to fill their positions in a manner calculated to advance the interests of the company and reputation of the road. The permanent location of these shops at this point is a great stimulus to the growth and business enterprise of Mattoon, and the donation by its citizens of the sum we have mentioned will prove to be an investment creditable to their forecast and sagacity.

Portable Furnace for Shrinking on and Removing Tires.

THIS apparatus is the invention of Mr. W. Bell Smith, of Charleston, S. C., and is designed to save much of the labor and expense ordinarily required in putting tires on locomotive wheels. By the use of the simple apparatus illustrated in the engraving, a tire of any size, and two and a half inches in thickness, with one sixteenth allowance for expansion, can be shrunk on with the consumption of only one bushel of charcoal, and in half an hour after lighting the fire. It was patented in June, 1869, and although no special exertions have been made to introduce it to the notice of railway-managers, it has gradually worked its way into favor and recognition, and will doubtless sooner or later be used in every railway-shop of importance in the country.



It consists of a box A, made in halves, of No. 10 sheet-iron, open at the top, and held together by hinge-joints so as to be easily separated. Brackets D D are secured to the sides of the box, to rest on the top of the tire B, and suspend it to the same. Holes are punched around the sides and bottom of the box for the admission of air to the fuel, (charcoal,) which occupies the space of four inches around the tire. The tire is suspended to a crane, the furnace then placed around it, and the charcoal put in and ignited. When the tire is sufficiently expanded, (which may be readily determined by measuring with a rod,) it is then placed on the wheel-centre C, resting on the gauges E E; the furnace is then removed and the tire cooled off, the unburned charcoal saved for the next operation; the furnace remaining around the tire until the operation is completed, obviates all danger of the tire sticking before reaching its destination, and will remove an old tire in less than twenty minutes, not heating the wheel-centre sufficiently to injure the paint.

Four hands can do this work easily, and be entirely free from the intense heat to which they are subjected by the old method.

Numerous testimonials from master-mechanics, locomotive-builders, and railway-superintendents, who have used the apparatus, fully confirm our estimate of its utility. Post & Kalkman, 111 Liberty Street, New-York, are the agents for its sale.

The Arlington Car-Manufacturing Company.

THIS company was organized several months since at Arlington, Vermont, for the purpose of manufacturing railway-cars. The officers are Orlando Canfield, President, H. S. Hard, Secretary and Treasurer, and A. D. Canfield, Superintendent. The company commenced operations in June last, and will for the present confine themselves to freight-work. The first specimens turned out were a lot of milk-cars of the refrigerator pattern, for the Harlem Extension Railroad. These cars are, from all accounts, very economical of ice, while keeping the milk cool and in good condition. The first one made the round trip from Bennington to New-York with a single change of ice, which was doing extremely well; and, at the same rate, would effect a large saving in the quantity of ice used, besides keeping the car at a much lower temperature.

The trucks under this style of car are very much like those under the passenger-coaches on the same road. They have spiral springs on the equalizing bars, and long elliptics, three in a set, on the swing-bea m, which gives a very easy and desirable motion. It is in fact a necessity that a milk-car should ride easily in order to carry its load in good condition ; and, moreover, as these trains run at a good rate of speed, it is a matter of economy to make the cars as easy on the track as possible. Another lot of the same class of cars, subsequently made at the above-named works, have been equipped with the Doty & Miltimore compound axle, and the result will be watched with a good deal of interest as a test of the practical working of this important innovation in axles.

The cars turned out by this company are, so far as we have observed, models of good and conscientious workmanship, and seem in all respects equal to those built by the railway-shops.

Colorado Central Railroad.

THE western division of this road (narrow gauge) has been completed a distance of sixteen miles, and is now in running order. It is, says the Omaha *Herald*, the most remarkable railroad that has been used for passenger transportation. The line follows the cañon of Clear Creek, which is extremely narrow, in some places contracted to a width of 40 feet. It has precipitous sides, from 800 to 1000 feet high. Through this cañon the railroad finds its way, following closely the side of the stream, but built upon rock foundation and beyond the reach of high water. The descent of the creek for sixteen miles is one hundred feet per mile, but it is extremely irregular, in many places moving along with very low velocity and at other points plunging over falls from fifteen to forty feet in height. The steepest grade used is 175 feet per mile, and the shortest curve is 180 feet radius.

All the cars used are fitted with one loose wheel on each axle, by which expedient the friction of the curvature is eliminated and the locomotives are enabled to draw trains with ease which it would be impossible to move if the cars were supplied with wheels of the ordinary construction. The average speed is eight miles per hour. The operation of a road with these peculiar characteristics being in some degree an experiment, the speed has been reduced to a limit which is perfectly safe. It is anticipated that a higher speed may hereafter be used with entire safety.

During the construction of this road many doubts were expressed as to the practicability of its operation, but the large amount of business which is now being transacted over it, and the freedom from accident which has attended its operation, have rendered it a matter of certainty that with proper care roads of this character, and often with grades exceeding 200 feet to the mile, may be advantageously used.

New Woodruff Sleeping-Cars.

THE Detroit *Tribune* thus describes some new and light sleeping-cars made by the Jackson and Sharp Company, of Wilmington, and designed by Mr. Jonah Woodruff:

"The interior differs radically from the Pullman cars. The two oval compartments occupying the ends, the remainder of the car before the berths are arranged presents the appearance of an ordinary palace-car. The berths are arranged in the seats and on the sides of the car, and when in place, the lower and upper ones are both lower than in other sleepers, thus rendering the upper ones far more desirable than they usually are. The wooden partitions generally used between the berths are not employed in the Woodruff cars. A division is effected by the arrange ment of the seats and by the way in which the upper berths are constructed, and by the additional use of very heavy curtains. The division is perfectly completed and a great deal of weight is thus got rid of, much of it high up in the car, where weight is always objectionable."

Automatic Machine Switches.

IT is a little singular that the large number of accidents, most of them attended with fatal and all of them with deplorable results, arising from the misplacement of switches on railroads, should not have turned the attention of inventors to the importance of substituting mechanical appliances for human watchfulness. It is a difficult matter for a man to be careful every moment; neither would it altogether serve the purpose of railroad companies to employ a better class of switchmen; since these better men would quite likely now and then have some other things to be thinking of; and would be very apt, at least occasionally, to become absent-minded when set about mechanical or monotonous work. The watching of switches ought to be done by machinery ; nor in this age of highly cultivated inventive ingenuity ought there to be any inseparable obstacle to the invention of an automatic switch-tender that should practically answer the purposes required of it. There is a fortune in it for somebody.—*American Manufacturer.*

Railway Curves.

THE Pittsburg *American Manufacturer* has been shown a device, the invention of a practical mechanic of that city, that seems to overcome all difficulties arising from curves, reducing the wear and tear both of the road and rolling stock, and saving much in power. It is also claimed that it will lessen very much the risk of accidents, as the cars will have no disposition to cross the track on the sharpest or most abrupt curve, that it can be applied to cars of all descriptions, including those now in use, is simple in construction, convenient, strong, durable, and comparatively inexpensive—in a word, that, with this device, curves are no longer an obstacle, but as heavy trains can be run over them, and with the same power, as over a straight road. The writer says he would be pleased to put any interested parties in communication with the inventor. We imagine that every railroad corporation in the land is an interested party in this matter, and will at once communicate.

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Correspondence.—*We cordially invite the coöperation of the railroad public in affording us the material for a good mechanical paper. Articles relating to rolling-stock and machinery, by those practically acquainted with those subjects, will be gratefully received. All communications must be addressed to Vose, Dinsmore & Co., No.* 1 *Barclay Street.*

The name and address of the writer must accompany all communications designed for publication.

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All communications in regard to advertising should be addressed to L. F. Dinsmore, *Post-Office Box* 4055, *New-York City, who is our agent for advertising, and authorized to make contracts, collections, etc.*

Engravings and Illustrations.

We would invite the attention of Master Car-Builders and others to the advantages to be derived from publishing in The National Car-Builder *engravings designed to illustrate the various features and details of car construction, and especially such improvements as can not otherwise be clearly presented. We will procure cuts to be made in the best manner from drawings or models that may be sent us, and charge only for the cost of engraving, inserting the same in our paper with suitable descriptive details, without charge.*

Notice to Subscribers.

On the first of January the subscription price of The Car-Builder will be increased to $1 a year. Its size will also be increased by four additional pages, making twenty-four pages, exclusive of cover. This enlargement has been rendered necessary to accommodate advertisers, and also to make more room for miscellaneous reading-matter.

In view of the fact that our paper has been increasd since its first issue to three times its original size, our readers will doubtless agree with us that the advance in subscription price is fully warranted.

It will be our aim to make The Car-Builder during the coming year more acceptable than ever to all who are interested in railway progress, and especially those more immediately connected with the mechanical departments and construction of rolling-stock; and we beg to solicit the aid and coöperation of our readers by a continuance of the liberal encouragement they have already given to our enterprise.

We regret to learn that the office of the *American Railway Times,* with its printing material, books, and valuable papers, was destroyed in the great Boston conflagration. It gives us pleasure, however, to be able to state that the publication of the paper will speedily be resumed, to the great satisfaction of its many readers.

Correction.—A typographical error occurred in our last issue in the bottom line of first column on page 11, by which we are made to say that the Toledo, Wabash, and Western railway-shops, at Toledo, turned out two first-class 54-foot coaches within the past year. We intended to say *ten* instead of two.

Steam on Street Railroads.

The time has at length come when horse-power as a means of propelling street-cars in our large cities must give place to something more effective. Like other old-time usages that have had their day and fulfilled their mission, it must yield to the inexorable logic of events; and when it has been fairly set aside, and steam as a motor installed in its stead, the wonder will be that the change was so long deferred. In this city especially, where the local passenger traffic is so enormous, and the morning and evening current sets alternately up and down-town with such an ever-increasing tide, the inadequacy of the present means of transit is painfully apparent. A car with fifty passengers, drawn by a single pair of jaded and overworked horses, up ascending grades and around sharp curves, is a spectacle by no means creditable to a civilization which boasts of its achievements in mechanical appliances and inventive skill. Such a spectacle, however, is constantly presented to our eyes in this metropolitan centre of refinement and opulence, and its apparent necessity has thus far caused it to be tolerated. The incessant demand upon the capacities of the leading lines, established usage, and the repetition of arguments more plausible than sound against any radical change, have hitherto operated to prevent any earnest effort being made; but the sudden and unlooked-for horse epidemic, producing only a temporary aggravation of the existing evil, has opened the eyes of the public, and they already begin to see "men as trees walking." The bugbear about street-engines frightening horses, has had its day. It was a very foolish bugbear, and now appears more so than ever, when the trains on the Greenwich street elevated railway go rattling along over our heads, frightening men and women far more than horses; to say nothing of drums, banners, steam fire-engines, and fifty other things to which the ordinary city-bred horse is, by familiarity, quite indifferent. As regards occasional accidents from the use of steam on street lines, they will of course occur in spite of every precaution; but let them be fairly weighed, as respects fatality and frequency, with those which occur from the use of horse-power, and this objection will cease to be a serious one.

Accidents or no accidents, however, the incipient steps have been taken toward introducing steam as a universal and permanent motor on our street railroads, and the municipal authorities, street line companies, timid old fogies, and all concerned, are preparing to accept the situation and realize the delights of rapid and comfortable transit above ground. Under the quickening influence of recent occurrences, a new engine for propelling street-cars on the tracks now in use, has already appeared, and has made a satisfactory trial of its capacity on one of our city lines having the heaviest grades and sharpest curves. It has the power of five horses, which may be increased at pleasure to much more than that. It is placed on the front platform of a car of the same size and similar in appearance to the ordinary street-car. It is compact in form, and does not encroach on the usual space occupied by passengers, nor is there any unpleasant heat experienced from the boiler, as it is separated from the inside of the car by a partition of non-conducting material. The cylinders are placed under the front platform in direct connection with the forward axle, while the water-tank is under the rear platform, and the water heated by exhaust steam. As regards economy of fuel, it is said that the car can run fifty miles with two hundred pounds of coal. The smoke is consumed, and there is no soot, cinders, or noise. The engine can be controlled as easily as a pair of horses, and when running at the rate of six miles an hour, the car can be stopped within a distance of twenty-five feet, by suddenly reversing the engine, and with the aid of brakes, within half its own length. Only two men are required to run it—a conductor and engineer.

This brief description must suffice for the present. We hope to be able, in a future number of our paper, to give a more full and detailed account of both car and engine, illustrated by engravings. The trial tests thus far made, demonstrate their capacity to ascend steep grades, turn curves where streets intersect at right angles, and to be at all times under complete control as regards stoppage and propulsion, the three essentials indispensable to the safe and practical working of a steam street-car. The revolution has begun, and as revolutions rarely go backward, we think the time is near at hand when horse-cars on our city thoroughfares will take their place in the category of remembered things, and the burden of Mr. Bergh's occupation be considerably lightened.

A Room for Master Car-Builders.

A commodious room is now being fitted up under the auspices of the Master Car-Builders' Association, at 111 Liberty street, designed for the use and convenience of members visiting the city, as well as a place of resort for railroad officials of every grade who are not members of the association. It will be open at all times, and provided with the necessary facilities for writing, correspondence, and the transaction of business. A register of the names of visitors will be kept, showing the date of arrival, where they are stopping, the names of the roads with which they are connected, and any other information that may be deemed important. Files of the leading railway and scientific newspapers will be kept, and the room will also be a receptacle of models and drawings, illustrating inventions and devices pertaining to the mechanical departments of railways; the leading object being to facilitate communication between railway men from different parts of the country who may be visiting the city, by having a suitable place known and recognized as headquarters, where they can meet and confer together. The fitting-up will soon be completed, and the room will be in readiness for a formal opening by the middle of the present month.

Graham's Equalizing Passenger-Car Truck.

This truck which has already been illustrated and described in a previous number of The Car-Builder, (March 1872,) has been introduced upon several roads, and in its practical working, has fully realized the expectations of its inventor; and, judging from present indications, the time is not very far off when it will be recognized and adopted as one of the indispensable adjuncts of an easy-running passenger-car. Every experienced traveler knows when a car strikes a curve, by the peculiar motion caused by the unequal distribution of weight upon the bearing surfaces of the truck; and travelers who are not experienced, are conscious of an unpleasant oscillation or rocking of the vehicle, quite different from the motion on a straight and level track. Also, when the weight of the load is concentrated on one side, as is the case when passengers wish to avoid the sun, there is a sensation or feeling that the seat is not level, and that the centre of gravity is not precisely where it ought to be.

The design of this equalizing arrangement, as applied to the truck, is to prevent these disagreeable sensations on the part of the passengers, by providing for a uniform bearing and thus keeping the car-body level, no matter how great may be the curve, or how unequal the distribution of weight within the car. This is done by the action of a pair of levers under the bolster, working in such a way that the weight thrown upon one is instantly and equally shared by the other, producing a corresponding depression of the springs on each side of the truck.

The device has been applied, and is in successful operation, on a drawing-room car on the Boston and Albany road; also on a day-car on the Pennsylvania road. A train has been equipped with them on the Lackawanna and Bloomsburg road, and they have been applied to baggage and express cars on the South Side of Virginia road with such satisfactory re-

sults, that ten additional cars are soon to be equipped in the same way. We may also mention that one of the "Vanderbilt" cars of the New-York Central road is provided with the equalizer, and runs admirably. The levers, of course, are some additional weight, but this is compensated by a reduction in the weight of the elliptics. Working-drawings may be had on application to Vose, Dinsmore & Co., 1 Barclay street, New-York.

Defects in Car-Framing.

BY W. E. PARTRIDGE.

In a former number of The Car-Builder, we ventured to call attention to the manner of framing cars which prevails in some of the Eastern shops. The disaster which occurred some time since on the Eastern railroad, makes it quite desirable that the subject should be again brought up.

Car-building in this country began in Massachusetts, or at least had one of its beginnings there, and, as was the case almost everywhere else, the first cars were built by coach-makers. When the roads afterward began to build their own cars, they naturally intrusted the work to men who already had some experience in car-building, or who were at least familiar with coach-making. This was an admirable policy in view of the fact that cars at that time were little more than double or treble coaches; but as railroad business increased, this style of vehicle was abandoned, and cars of the long or saloon pattern began to be the only ones used, and they are still used universally on our roads. In too many instances, however, when the pattern of the car was changed, the method of framing was not sufficiently modified to give the maximum strength to the new structure, and many of the long cars are now running whose strength is sadly out of proportion to the amount of material used in their construction. The most objectionable features seem to be the cross-framing of the sills, the tendency to make the car too weak in the centre, and the enormously heavy cross-sills in the frame. Sometimes the master car-builder finds himself hampered by being compelled to adhere to the style of construction already adopted by the road.

On the Old Colony and Newport road, the passenger-cars are 50 feet long, 9 feet 6 inches wide, with 35 cross-sills, and only two longitudinal ones running the whole length of the car. There are several 12-foot sills of the latter kind in the ends, reaching back past the centre-plate; but these are not available for holding up the centre of the car. No truss-rods are used, nor is there any cross-trussing; but there are 21 three-quarter-inch rods running from side-sill to side-sill. These sills are weakened by the cutting of so many mortices, while the weight of the cross-sills is an increased burden, without the gain of any additional strength. In the early days of railroading in the neighborhood of Boston, the end of a rail, or "snake-head," was forced through the bottom of a car, seriously injuring several of the passengers. Heavy floors were consequently adopted, and have been continued on many roads, although such an accident, with the rails now in use, is next to impossible. The cars referred to are sealed underneath with 1¼-inch hard-pine, which is too heavy, but much lighter than the plank which is spiked on by some roads.

These Old Colony and Newport cars have many points which might be adopted to advantage by some other roads. The roofs are framed separately, and add much to the strength of the cars; they are also bolted down between all the windows by ⅝ bolts, and all the panels are glued fast.

On the Eastern Railroad, after the Revere accident, there was a great demand for new cars, and the Miller platform was adopted. Those built by the company are 44 feet 5 inches long, and 9 feet 5 inches wide. The posts are 1⅛ by 3⅛. The truss-planks are 11¾ by 3¼ and fastened by one lag-screw to each post. These planks and the sills underneath sustain the whole weight of the car, no braces being used between the posts in the walls, and no longitudinal sticks in the centre. The cross-sills are 3 by 6¾ and go into the side-sills with a joint-bolt. These cars are, in case of accident, without the strength they might easily be made to have, were the timber in them properly disposed. An inspection of one of them that had been dragged but a very short distance along the ties, showed that every cross-sill was destroyed and the car ruined. Such a result was inevitable. The timber was disposed at right-angles to the blow, a position which received its greatest force while opposing the smallest resistance. The same may be said in case of a butting collision. Should one of these cars be rolled over and over down an embankment, the result would in all probability be its entire destruction. In the accident which happened a year ago at Bangor, this style of cars showed great want of strength, their own weight being apparently a sufficient load. Unless some change is made in this mode of construction, there will be a fearful tale to tell wherever an accident occurs, while with stronger and better framed cars the damage and loss of life would be comparatively trifling.

Ornamental Glass.

This material constitutes one of the indispensable features of palace and drawing-room coaches, serving the purposes both of utility and ornament. In connection with the interior finishing of rare woods and sumptuous upholstery, it produces an effect that satisfies the most fastidious, and gives to the vehicle all the elegance of a palatial apartment. The specimens of this material to be seen at the manufactory of Messrs. A. S. Taylor & Co., 63 and 65 Elizabeth street in this city, and specially designed for car-purposes, will enable one to form an idea of the progress that is being made in this branch of the mechanic arts. These specimens embrace embossed and cut glass, including a great variety of elaborate and elegant designs suited to first-class cars. The proprietors give special attention to the wants of car-builders, and are constantly devising new styles and patterns to meet the demands of a growing appreciation of artistic elegance in the construction and embellishment of our railway passenger-coaches. We take pleasure in referring our readers to their advertisement on fourth page of cover.

We regret to learn that Mr. Charles Graham, master-mechanic of the Lackawanna and Bloomsburg Railroad, was shot on the 13th ult., by a man named John D. Hopper, formerly foreman of the carpenter-shop at Kingston, Pa., but who had been discharged by Mr. Graham a few days previous to the occurrence. We rejoice to learn, however, that the wound, although a severe one, is not considered dangerous, and that there is every probability of Mr. Graham's speedy recovery. The would-be assassin has been arrested and is now in prison.

Miscellaneous Items.

The Erie Railway Company, on the first of October last, abolished the office of general master-mechanic, Mr. E. O. Hill retiring from the same. A new department was organized, called the department of rolling-stock, of which Mr. M. E. Brown was appointed superintendent, and Mr. E. B. Hill assistant superintendent, with headquarters at the company's offices in New-York City.

The Litchfield (Ill.) Car Manufacturing Company began operations about four months ago. Since that time it has turned out about one hundred and eighty cars, of which number one half were box and the other coal-cars.

A writer thus describes a safety-switch, in use on the New-York and New-Haven railway, which he thinks would have prevented the disaster at Seabrook, had it been in use there: "The lever of the switch is inclosed in a small house or sentry-box, the door of which is locked. When the switchman enters the house and opens the switch, he *thereby* shuts the door of the house or box, from which he can not make his exit till, by *shutting* the switch, he thereby *opens* the door of the box. If by any chance a train comes along while the switch is open, he must make his escape from the box to avoid the probability of being himself killed. He can not make his escape without shutting the switch. Therefore, every time a switchman opens a switch, he is bound, *under penalty of death*, to have it closed before any train comes along.

"One man can attend to only one switch, and the fact that it calls for an extra expenditure of labor will probably prevent its being used by the great number of our corporations, who seem to prefer paying money for damages rather than in the employment of a sufficient number of flagmen, conductors, etc., to make traveling safe."

An engine, designed for propelling street-cars especially, has recently been brought out and tested by a New-Orleans inventor. It is claimed to save 33 per cent over running by mule-power. The driving engine is of ordinary character, has a 300-gallon reservoir with steam-room above; boiler, steel, well covered with non-conducting material to prevent the radiation. The motive-power is obtained by compression of steam in water, the steam being conducted from a stationary boiler at the end of the track, dispensing with firing up while under way. The steam is sufficient (according to capacity of boiler) to run 10 to 15 miles. At the time of charging, the temperature in the boiler is 380 degrees F., the pressure being 178 pounds per square inch. There is not the least danger of explosion, as the pressure in the reservoir can never rise above that point at time of charging, and constantly diminishes as the power is expended. So simple is its construction, there is less skill required than in handling a horse or mule.

The car-shops of the Michigan Central Railroad, at Detroit, are to be reconstructed at a point twelve miles west of the city, near Grand Trunk Junction. The new buildings will be much larger than those now occupied, and will be constructed upon the most improved methods. The freight-car erecting-shop will be circular in form, like the one at Altoona, Pa. The grounds include an area of ninety acres. The work will be prosecuted during the ensuing year, and the immediate expenditure will be about half a million of dollars.

The Eastern Railroad Company have added three new coal-burning passenger-engines to their rolling-stock. These engines are the largest on the road. The cylinders are 17 inches in diameter by 24 inches stroke; drivers, 5 feet 8 inches in diameter; wheel-base, 21 feet 10½ inches; rigid wheel-base, 8 feet; weight of engine, with fuel and water, about 66,000 pounds; capacity of tender-tank, 2,000 gallons. The engines are all supplied with Richardson's patent safety-valves, Thompson's grate pattern, and fitted with the Westinghouse air-brake. These locomotives were built at the Hinkley & Williams Works, Harrison Avenue, Boston, Mass. The materials are of the very best quality, and the workmanship and excellent finish do credit to the builders.

There are now 1899 locomotives running on the railroads centring in Chicago. The average weight of these iron horses is 60,000 pounds, and their average cost $12,000. The average life of an engine is 25 years, and it will run on an average 30,000 miles a year, or 750,000 miles in a lifetime. Each engine costs its owner about 20 cents per mile run for fuel and care, and about 8 or 10 cents for repairs. The engines of Chicago take out and bring in 135,050 trains a year, earning about $83,000,000. They transport, over the various roads traveled, upward of 6,000,000 passengers.

At the recent half-yearly meeting of the Grand Trunk Railway Company, in London, the president said that 3500 to 4000 rails on the line break every

winter! But he found comfort in the fact that, in about 110 miles of steel track, only eight or ten rails have broken. It was feared when Bessemer rails were first introduced that their resistance to wera would be counterbalanced by unusual liability to break, and that they would be especially dangerous in severe climates, the impression being apparently that, having something of the hardness of cast-iron, they had also something of its brittleness. This experience of the Grand Trunk Railway, however, indicates that they are especially fitted for such climates.

A PATENT vacuum brake is to be introduced on the Philadelphia and Reading Railroad. "It is said" to possess superior merits over the Westinghouse air-brake. Since the Catawissa passed into the hands of the Reading, large gangs of repairmen have been put at work along the route, giving the track and bridges attention which was very much needed. The increased passenger and freight-traffic over the road under its new management demanded these alterations.

A NEW car has just been built at Readeville for the Boston, Hartford, and Erie Railroad. It is for the steamboat train, and all the seats are supplied with head-rests made of cane. Otherwise it is exceedingly comfortable, and is, besides, elaborately ornamented.

THE new shops of the Atlantic and Great Western Railroad at Meadville, Pa., are rapidly approaching completion. One of the car-shops is already in use, and the roofing of the principal shop is nearly finished. Nearly all the buildings will be finished by the end of November, and much of the machinery is already in.

THE New-York Central Railroad shops in Syracuse are to be removed to a location two miles and a half east of the city, in the town of Dewitt. A branch line is also to be built around the city of Syracuse, on the north side, about nine miles long, between Geddes and Dewitt, for the exclusive use of through freight-trains, in order to relieve the city from the interruptions to travel and business now experienced from those trains.

THE capital stock of the Jacksonville (Ill.) Car Manufacturing Company has all been subscribed, and the establishment of extensive car-works in that city at an early day is assured.

MR. H. M. KINGSLEY, of Chicago, a famous caterer, who had charge, at one time, of the Pullman dining-cars, has been appointed to take charge of the hotels and eating-houses of the Baltimore and Ohio Railroad. Just now he is furnishing the great hotel at Cumberland.

THE Springfield *Republican* says the Connecticut River Railroad Company is about introducing, for trial, a set of paper car-wheels under the forward truck of one of its engines. These wheels have been known to car-builders for some time, but the demand for them has been moderate on account of their cost, notwithstanding the universally admitted fact that they are safe and easy-going. The wheels are manufactured by bringing a pressure of 350 tons upon sheets of common straw-paper, which forces them into a compact mass, which is then turned perfectly round, and the hub forced into a hole in the centre; this requiring a pressure of 25 tons weight. The tire is of steel, and has a one quarter inch bevel upon its inner edge, thus allowing the paper filling to be forced in, 250 tons pressure being required in the process. Two iron plates, one upon each side of the paper, are bolted together, which prevents the possibility of the fillings coming out. The tire rests upon the paper only, and partakes of its elasticity in consequence. Although these wheels are much more expensive than those in common use, the patentee claims that they are cheaper in the end, as they wear longer, injure the tracks less, and run with less noise than wheels of any other pattern.

Facetiæ.

A LOCAL reporter for a down-east newspaper prepared two articles for publication, one being an account of the presentation of a gold-headed cane to the Rev. Dr. Mudge, the clergyman of the place, and the other a description of a patent hog-killing and sausage machine, just put in operation. The foreman of the office, in making up the forms, got the two articles mixed, and the paper was issued with the sum and substance of each blended as follows:

"Several of the Rev. Dr. Mudge's friends called upon him yesterday, and after a brief conversation the unsuspecting hog was seized by the hind legs and slid along a beam, until he reached the hot-water tank. His friends explained the object of their visit, and presented him with a very handsome gold-headed butcher, who grabbed him by the tail, swung him round, cut his throat from ear to ear, and in less than a minute the carcass was in the water. Thereupon he came forward and said there were times when the feelings overpowered one, and for that reason he would not attempt to do more than thank those around him, for the manner in which so huge an animal was cut into so many fragments was simply astonishing. The doctor concluded his remarks, when the machine seized him, and in less time than it takes to write it the hog was cut into fragments and worked up into delicious sausage. The occasion will long be remembered by the doctor's friends as one of the most delightful of their lives. The best pieces can be obtained for fifteen cents a pound, and we are sure that those who have sat so long under his ministry will rejoice that he has been so handsomely treated."

THE most polished man in Belfast, Me., just now is a dry-goods merchant, whose wife undertook to bathe him all over with balsam for the rheumatism. After the job was well done, she looked at the label of the bottle, and found it was furniture-polish she had been using.

A BOARDER looked very discontentedly at a beefsteak, and the landlady, having observed him, said, "Don't the steak suit you?" "Yes," said the boarder, "it's good enough, what there is of it; and there's enough of it, such as it is."

"JOHNNY, my dear, run to the store and get some sugar," said a mother to a precocious son of eleven years. "Excuse me, ma, I am somewhat indisposed this morning. Send father; and tell him to bring a paper of fine-cut along."

A TRAVELER stopped at an inn, in a neighboring village, and finding the landlord and landlady fighting, cried out, "Hallo! who keeps this house?" The wife replied, "That's just what we are trying to decide."

AN indulgent Kansas parent sold his cooking-stove for $11 in order to take his thirteen children to the circus. He says a circus only comes two or three times a year, and, besides, he never had much to cook on the stove anyhow.

THE "bottle of sacred oil" recently found amid the ruins of Pompeii turns out to have been nothing but a bottle of whisky inadvertently left behind by a picnic party.

THE most gallant man ever heard of is one who refrained from kicking a dog that had bitten him, because it was a female dog. "If it wasn't for your sex," said he, "I'd kick your head off."

THE St. Louis *Globe* tells about a youth, just married, who left that city with his bride on an Eastern tour, *via* Vandalia, the other evening, who insisted on having a bedroom with a door to it; didn't want any of "yer durn curtain fixins."

"YOU saved my life at the battle of Malvern Hill," said a beggar to a captain. "Saved your life? How?" "I served under you, and when you ran away, *I followed.*"

A CHICAGO reporter announces that "the receipt of another ship-load of blackberries from St. Joe, yesterday, created a perceptible ripple in the toothpick trade."

ONE General E. M. Lee has a lecture prepared on "Four Years in the Saddle with Sheridan and Kilpatrick." It seems to us that that saddle must have been very much crowded, and we do not see how they stood it so long.

AN innocent-minded Brooklyn girl said to a gentleman the other night, "The mosquitoes are terrible. I wish you could see my back!" "I wish I could," was the quiet reply.

A DRUNKARD, on being told that the earth is round and turns on its axis all the time, said: "I believe that, for I've never been able to stand on the darned thing."

A MAN from the Auburn prison says he lost there all his admiration for auburn locks.

A NEGRO, who was suspected of surreptitiously meddling with his neighbor's fruit, being caught in a garden by moonlight, nonplused his detectors by raising his eyes, clasping his hands, and piously exclaiming, "Good Lord! this yere darkey can't go nowheres to pray, any more, without being 'turbed!"

A PARISIAN landlady requested a Christmas party on the third floor to cease dancing, as a man below was dying. The guests acquiesced. Returning an hour later, "My dear children," she exclaimed, with the most benevolent smile, "you may begin again—he's dead."

A CALIFORNIA man tied one end of a lariat around his waist and lassoed a cow with the other. He thought he had the cow, but at the end of the first half-mile he began to suspect the cow had him.

AT a certain church fair, a set of Cooper's works was promised to the individual who should answer a set of conundrums. A dashing young fellow was pronounced the winner, and received a set of wooden pails.

AN Irish advertisement: "If the gentleman who keeps a shoestore with a red head, will return the umbrella of a young lady with the ivory handle, he will hear something to her advantage."

"ARE you the mate of the ship?" asked an emigrant of the cook, who was an Irishman. "No, sir," was the reply, "I'm the man who cooks the mate."

A SOUTH street boy can make one hundred and sixty-five "faces" without sitting down. The feelings of his broken-hearted father, when reaching for him with a strap, can better be imagined than described.

AN old lady gave this as her idea of a great man: "One who is keerful of his clothes, don't drink sperets, ken read the Bible without spelling the words, and eat a cold dinner on wash-day without grumbling."

THE Boston car-drivers complain that old ladies punch them in their backs with parasols when they want the car stopped.

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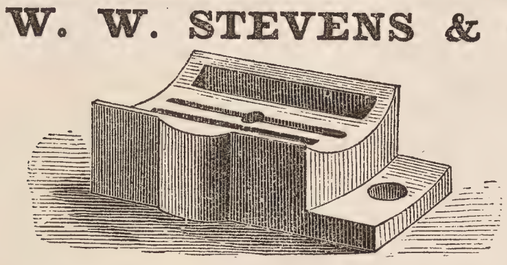

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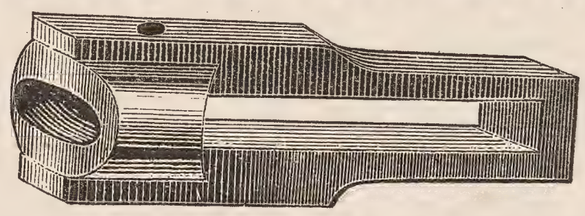

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B

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C

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Cincinnati, Hamilton & Dayton	William Cullen.	W. H. H. Allison	Cincinnati, Ohio.
Cincinnati & Muskingum Valley	Leroy Kells	Daniel Jewell	Lancaster, Ohio.
Cincinnati & Indianapolis Junction	W. McKinzie	Edwin Beeny	Indianapolis, Ind.
Cincinnati, Sandusky & Cleveland	John Y. Beatty.	William Earick	Sandusky, Ohio.
Columbus, Chicago & Indiana Central	(See Pitts. Cinn. & St. Louis)		
Concord	Chs. L. Eastman	M. W. Dickerman	Concord, N. H.
Concord & Claremont	J. N. Lander	A. Langmaid	Concord, N. H.
Connecticut River	John Mulligan	R. Hitchcock	Springfield, Mass.
Contoocook River			Concord, N. H.
Conn. & Passumpsic Rivers	Horace Alden	Horace Alden	Lyndon, Vt.
Cumberland Valley	A. S. Hull	C. W. Nitterhouse	Chambersburg, Pa.
Cumberland & Pennsylvania	W. L. Jordan	J W. Sauerbach	Mt. Savage, Md.
Central of Georgia		C. C. Millar	Savannah, Ga
Central of New-Jersey	*T. W. Peeples	George Hackett	Elizabethport, N. J.
Lehigh & Susquehanna Div	L. C. Brastow	L. C. Brastow	Wilkesbarre, Pa.
Central Branch Union Pacific	Wm. D. Rowley		Atchison, Kansas.
Central R. R. of Iowa	O. R. Ford	O. R. Ford	Marshall, Iowa
Central Pacific	A. J. Stevens	Benjamin Welch	Sacramento, Cal.

D

Railroad.	*Master-Mechanic.*	*Master Car-Builder.*	*Residence.*
Dayton & Union	A. J. Keenan	J. F. Feicht	Dayton, Ohio.
Danbury & Norwalk	Charles A. Craig		Danbury, Ct.
Dayton & Michigan	William Cullen	W. H. Allison	Cincinnati, Ohio.
Denver & Rio Grande	John Greenwood		Denver, Col.
Delaware, Lackawanna & Western	Walter Dawson	Robert McKenna	Scranton Pa
Des Moines Valley	James Lamb	R. E. Smith	Keokuk, Iowa.
Detroit & Milwaukee	Andrew Wilson		Detroit, Mich.
Detroit, Lansing, & Lake Michigan	Tho. G. Roberts		Detroit, Mich.
Delaware & Hudson Canal Co	James Dickson	Thomas Orchard	Carbondale, Pa.
Rensselaer & Saratoga Div	W. B. Gage		Troy, N. Y.
Dorchester & Delaware			Cambridge, Md.
Dubuque South western	I. M. Smith	I M. Smith	Farley, Iowa.
Dutchess & Columbia	W. G. Vanbuskirk	H. A. Webster	Fishkill, N. Y.
Dunkirk, Warren & Pittsburg	J. C. Haggett	J. C. Haggett	Dunkirk, N. Y.

E

Eastern		J. P. Somerby	Salem, Mass.
Eastern	John Thompson		East-Boston, Mass.
East-Tennessee & Virginia	Eli Hixon	Jos. Armbruster	Knoxville, Tenn.
East-Tennessee & Georgia	Eli Hixon		Knoxville, Tenn.
East Pennsylvania	J. M. Geary	Samuel Reeves	Reading, Pa
Elizabethtown and Paducah	W. D. Robb	T. A. Cordrey	Elizabethtown, Ky.
Erie Railway	‖‖M. E. Brown		Susquehanna, N. Y.
Erie Railway	James B. Gregg		Susquehanna, N. Y.
Erie Railway	H. L. Brown	C. A. Smith	Jersey City, N. J.
Erie Railway	J. G. Hubbard	M. Wilder	Buffalo, N. Y.
Erie Railway	W. E. Cooper	W. E. Cooper	Hornellsville, N. Y.
Erie Railway		W. E. Rutter	Elmira, N. Y
Evansville & Crawfordsville	John L. White	Joseph Stiker	Evansville, Ind.
Evansville, Henderson & Nashville	H. M. Smith	W. H. H. Price	Henderson, Ky.
European & North Am. (of Maine)	A. O. Bailey	J. H. Brown	Oldtown, Maine.
Erie & Pittsburg	John Young	John Young	Erie, Pa.
Evansville, Terre Haute, & Chicago			Terre Haute, Ind.

F

Flushing & North Side			
Florida	A. W. Taylor	G. Hernandez	Fernandina, Fla.
Flint & Pere Marquette	Sanford Keeler	Sanford Keeler	East-Saginaw, Mich.
Fitchburg	Geo. A. Cooledge	Enos Varney	Charlestown, Mass.
Fitchburg & Worcester	John Webster	Samuel Stevens	Fitchburg, Mass.

G

Grand Trunk		Warren Noyes	Gorham, Me.
Grand Trunk	†Richard Eaton	J. W. W. McWood.	Montreal, Canada.
Grand Trunk		Howard Fry	Sherbrooke, Can.
Grand Trunk		B. J. Mitchell	Portland, Me.
Galveston, Houston & Henderson	Wm. Macbeth	Wm. Macbeth	Galveston, Texas.
Grand Rapids & Indiana	J. M. Boon		Fort Wayne, Ind.
Great Western of Canada	†Wm. A. Robinson	F. Childs	Hamilton, Canada.
Georgia	William Hardman	T. M. Preval	Augusta, Ga.
Greenville & Columbia	J. T. Price	J. T. Price	Helena, S. C.

H

Harlem Extension	George W. Blanchard		Rutland, Vt.
Harlem Extension		C. S. Clapp	Bennington, Vt.
Hanover Branch	John J. Bingley	Henry Britcher	Hanover, Pa.
Hartford & New-Haven	John O. Chapman	F. Leppense	Hartford, Ct.
Hannibal & St. Joseph	H. A. Towne	H. C. Whiting	Hannibal, Mo.
Hartford, Providence & Fishkill	Edwin Garfield	V. D. Perry	Hartford, Ct.
Hackensack & New-York	Abra'm Angausen		Hackensack, N. J.
Housatonic	C. R. Morris	J Ferris	Bridgeport, Ct.
Houston & Texas Central	George Stevens	F. S. Tull	Houston, Texas.
Houghton & Ontonagon			L'Anse, Mich.
Houston Tap & Brazoria	T. J. Shellhorn	T. J. Shellhorn	Houston, Texas.
Huntington & Broad-Top Mountain	D. G Gilchrist	M. Tellerhoof	Saxton, Pa.
Hempfield	T. Marsh		Wheeling, Va.
Houston & Great Northern	T. J. Shellhorn	T. J. Shellhorn	Houston, Texas.

I

Indianapolis, Cincinnati & Lafayette	J. S. Patterson	S. Griffith	Cincinnati, Ohio.
Indianapolis, Peru & Chicago	John McKenna	John McKenna	Peru, Ind.
Illinois Central	†S. J. Hayes	H. O. Wadlie	Chicago, Ill.
Chicago Division	George Holton		Chicago, Ill.
South Division	David Oxley		Centralia, Ill.
North Division	J. B. Edams		Amboy, Ill.
Iowa Division	Thomas W. Place		Waterloo. Iowa.
Iowa & Missouri State Line			Farmington, Iowa.
Iron	Perry Scott	Clem. Roetling	Ironton, Ohio.
Indianapolis & St. Louis	Wm. Barkla	R. B. More	Mattoon, Ill.
Indianapolis, Bloomington & Western	Tho. V. Losee	Tho. V. Losee	Urbana, Ill.
Ionia & Lansing	H. Loughlin		Lansing, Mich.
Indianapolis & Vincennes	A. E. Allcott		Indianapolis, Ia.

J

Jeffersonville, Madison & Indiana	Reuben Wells	John Higgins	Jeffersonville, Ind.

K

Knox & Lincoln			Bath, Maine.
Kentucky Central	J. R. Ledyard	J. L. Hackathorn	Covington, Ky.
Knoxville & Charleston			Knoxville, Tenn.
Kansas Pacific	**L. H. Waugh		Wyandotte, Kansas.
Denver Pacific Div	**L. H. Waugh		Wyandotte, Kansas.
Denver & Boulder Valley Div.	**L. H. Waugh		Wyandotte, Kansas.
Junction City & Ft. Kearney Div.	**L. H. Waugh		Wyandotte, Kansas.
Arkansas Valley Div	**L. H. Waugh.		Wyandotte, Kansas.
Kalamazoo, Allegan & Grand Rapids			Kalamazoo, Mich.
Kansas City, St. Joseph & Council Bluff.	H. L. Cooper	H. L. Cooper	St. Joseph, Mo.

L

Lake Erie & Louisville	John Pero		Fremont, Ohio.
Lake Superior & Mississippi	W. McFarland	A .Coburn	St. Paul, Minn.
Lackawanna & Bloomsburg	Chas. Graham		Kingston, Pa.
Lehigh Valley	John I. Kinley		South-Easton, Pa.
Lehigh Valley	P. Hofecker	E. R. Brown	Weatherly, Pa.
Lehigh Valley	A. Mitchell	Mauch Chunk, Pa.	Delano, Pa.
Lehigh Valley	D. Clark		Hazleton. Pa.
Leavenworth, Lawrence & Gal.	S. M. Philbrick		Lawrence, Kansas.
Little Rock & Fort Smith	A. Klohs		Little Rock, Ark.
Little Miami	J. H. Setchel		Cincinnati, Ohio.
London & Port Stanley			London, C. W.
Louisville, New-Albany & Chicago	Jacob Losey	Jacob Losey	New-Albany, Ind.
Long Island	Chs. A. Thompson		Hunter's Point, L.I.
Louisville, Cincinnati & Lexington	John Skidmore	S. S. Pilson	Louisville, Ky.
Louisville & Nashville	†Thatcher Perkins		Louisville, Ky.
Louisville & Nashville	Jas. Montgomery		Bowling Green, Ky.
Louisville & Nashville		Isaac Owens	Louisville, Ky.
Louisville & Nashville	Tho. Welsh		Memphis, Tenn.
Louisvil e & Nashville	Richard Dolby		Edgefield, Tenn.
Louisville & Nashville	Wm. Russell		Decatur, Ala.
Louisville & Nashville	D. P. Rennie		Birmingham, Ala.
Nashville & Decatur Division	C. D. Knowles		Nashville, Tenn.
Lake Shore & Michigan Southern	‡James Sedgley	‡‡John Kirby	Cleveland, Ohio.
Michigan Southern Division	William Hill		Elkhart, Ind.
" " "		S. S. Knapp.	Adrian, Mich.
Toledo Division	Geo. H. Tier	Frank O. Bray	Norwalk, Ohio.
Erie Division	L. O. Gassett	J. Withyecombe.	Cleveland Ohio.
Buffalo Division	B. H. Kidder	A. Robson	Buffalo, N. Y.

M

Marquette & Ontonagon	A. P. Burroughs	H. D. Lyons	Marquette, Mich.
Macon & Augusta			Macon, Ga.
Maine Central	J. W. Philbrick	J. W. Philbrick	Waterville, Me.
Macon & Western	D. M. Gogul	James A. Knight	Macon, Ga
Manchester & Lawrence	Chas. L. Eastman.	M. W. Dickerman.	Concord, N. H.

Railroad.	Master-Mechanic.	Master Car-Builder.	Residence.
Macon & Brunswick	M. Thornton	M Thornton	Macon, Ga.
Marietta & Cincinnati	E. Bosley	E. Bosley	Chillicothe, Ohio.
Memphis & Little Rock	N. Greener	C. W. Wooldridge	Huntsville, Ark.
Memphis & Charleston	Michael Burk	A W. Drew	Memphis, Tenn.
Memphis & Charleston	H. N. Burford	Fabien Varin	Huntsville, Ala.
Mineral Point	Robert Hay		Mineral Point, Wis.
Mississippi & Tennessee	James Eblen	James Eblen	Memphis, Tenn.
Mississippi Central	Henry Gibbon	John E. Becton	Water Valley, Miss
Maryland & Delaware	Samuel Peters		Greensboro, Md.
Mississippi, Gains. & Tus			Gainsville, Ala.
Midland Pacific			Nebraska City, Neb.
Milwaukee & St. Paul	T. S. Davis	Wm. E. Kettridge	Milwaukee, Wis.
Milwaukee & St Paul		John Baillie	Milwaukee, Wis
Milwaukee & St. Paul	J. Pattee	D. F. Wilson	Minneapolis, Minn.
Hastings & Dakota Division	C. C. Clements		Hastings, Minn.
Michigan Central	A. S. Sweet, Jr	J. B. Sutherland	Detroit, Mich.
Grand River Valley Division		James Potts	Jackson, Mich.
J'kson, Lans'g & Saginaw Div	Andrew Wilson	Andrew Wilson	Jackson Mich.
Montgomery & West-Point	J. McVey	W H Daniels	Montgomery, Ala.
Montgomery & Eufaula	James McCann	I. E. Holmes	Montgomery, Ala.
Mobile & Montgomery	James McFarland	L. Barham	Montgomery, Ala
Mobile & Girard	William Eyles	A. J. Nix	Girard, Ala.
Mobile & Ohio	L. J. Fleming / B. S. Skates	John McHugh / B. S. Skates	Mobile, Ala. / Whistler, Ala.
Missouri River, Fort Scott & Gulf	John S. McCrum		Kansas City, Mo.
Missouri River, Fort Scott & Gulf		Josiah Stahl	Wyandotte, Kan.
Missouri, Kansas & Texas	C. T. McIlvaney	J. Townsend	Sedalia, Mo.
N			
Nashville & Chattanooga	John U. Eastman	J. G. Sawyer	Nashville, Tenn.
Nashville & Decatur	C. B. Knowles	C. B. Knowles	Nashville, Tenn.
New-Bedford & Taunton	Robert Chase	Robert Chase	New-Bedford, Mass.
New-Canaan			New-Canaan, Ct.
New-Brunswick & Canada	T. Armstrong	T. Armstrong	S'nt Andrew's, N.B.
New-Haven & Northampton	Henry Fox	Henry Fox	New-Haven, Ct.
New-York & Harlem	Wm. M. Strong	Leander Garey	New-York.
New-York Central & Hudson River	‡G. B. Van Vorst		Albany, N. Y.
New-York Central & Hudson River	Henry Watkeys		Syracuse, N. Y.
New-York Central & Hudson River	Amos Gould		Rochester, N. Y.
New-York Central & Hudson River	Jas. Butman	Wm. Johnson	Buffalo, N. Y.
New-York Central & Hudson River	Wm. Buchanan	John McKenna	New-York.
New-York Central & Hudson River	John Dikeman		East-Albany, N. Y.
New-York Central & Hudson River		Joseph Jones	West-Albany, N. Y.
New-York Central & Hudson River		George Rowe	Niagara Falls, N.Y.
New-York, Boston & Montreal	S. W. Tozer	S. W. Tozer	E. Tarrytown, N.Y.
New-York & Oswego Midland	Wm. H. Griggs	Wm. H. Griggs	Oswego, N. Y.
New-York, Providence & Boston	Jas. H. Anderson	Jas. H Anderson	Providence, R. I.
New-York & New-Haven	H. Kittendorf		New-Haven, Ct.
New-London Northern	J. W. Dow	S. W. Caulkins	New-London, Ct.
New-Jersey Midland	J. E. Wiggins	J. E. Wiggins	Godwinsville, N. J.
New-Jersey Southern	Rufus Blodgett		Manchester, N. J.
New-Haven & Derby			New-Haven, Ct.
New-Orleans, Opelousas & Gt. Western	John McCluskey	Matthew Nolan	Algiers, La.
New-Lisbon			Leetonia, Ohio.
New-Orleans & Ohio	John R. Jordan	John R. Jordan	Paducah, Ky.
New-Orleans, Jackson & Gt. Northern	John Conlon	Charles Bartine	New-Orleans, La.
New-Haven, Hartford & Springfield			Hartford, Ct.
Naugatuck		George W. Gray	Bridgeport, Ct.
Newark & Bloomfield	Luke F. Tronson		Hoboken, N. J.
Nova Scotia	W. Johnson		Bedford, N. S.
North-Carolina	Rufus D. Wade	B G. Sergeant	Co. Shops, N. C.
New Orleans, Mobile & Texas	Josiah Bettis	W. H. Johnson	Mobile, Ala.
Northern Central	C. M. Lewis		Baltimore, Md.
Northern Central		G. W. Demarest	York, Pa.
North-Lebanon		Henry B. Oves	Lebanon, Pa.
North-Pennsylvania	Franklin Roop	Franklin Roop	Philadelphia, Pa.
North Eastern	D. W. Haines	A. M. Corrie	Florence, S. C.
Northern	James W. Lander	Albert Langmaid	Concord, N. H.
Northern of New-Jersey	T. W. Demorest		New-York.
Norwich & Worcester	Richard Colburn	G. R. Bentley	Norwich, Ct.
Northern of Canada	P. Clark.	P. Clark	Toronto, Can.
Northern Pacific	§§Geo. W. Cushing		St. Paul, Minn.
O			
Ogdensburg & Lake Champlain	William A. Short	J. R. Ames	Malone, N. Y.
Old Colony & Newport	J. K. Taylor	A. Gleason	Boston, Mass.
Orange, Alexandria & Manassas	James E. Waddey	John T. Nalls	Alexandria, Va.
Oil City & Pithole	George Thompson		Pithole, Pa.
Oil Creek & Alleghany River	J. S. McElroy	Jacob Williams	Corry, Pa.
Oil Creek & Alleghany	H.J.Bookhammer.	John Monks	Oil City, Pa.
Ohio & Mississippi		M. Contant	Cochran, Ind.
East Division	A. Thompson		Cochran, Ind.
West Division	H. Elliott	E. Martin	East St. Louis, Ill.
P			
Panama	Chas. E. Stewart	J. G. Wilson	Aspinwall, N. G.
Pacific of Missouri	§§John Hewitt	John Hewitt	St. Louis, Mo.
Pennsylvania	§§G. C. Gardner		Altoona, Pa.
Pennsylvania	H. D. Garrett	I. W. Van Houten.	W. Philadelphia, Pa
Pennsylvania	E. L. Caum	Samuel W. Myers.	Harrisburg, Pa.
Pennsylvania	G W. Strattan	John P. Levan	Altoona, Pa.
Pennsylvania	D. O. Shaver	R. S. Ramsey	Pittsburg, Pa.
New-Jersey Division	John Headden	David H. Baker	Jersey City, N.
Philadelphia & Erie	Martin Walls / W. L. Foster / W. L. Holman / W. T. Smith	George J. Mason. / Robt M.Messimer. / Wm. P. Newcomb. / David Cowley	Sunbury, Pa. / Renovo, Pa. / Kane, Pa. / Erie, Pa.
Philadelphia, Wilmington & Baltimore	S. A. Hodgman	George W. Perry.	Wilmington, Del.
Philadelphia & Reading	L. B. Paxson	Aaron Steinbach	Reading, Pa.
Philadelphia, Germ'n & Norris'n	John Moyer	Nathan Pawling	Philadelphia, Pa.
Philadelphia & Baltimore Central	S. D. Danfield	SamuelD.Danfield.	Chester, Pa.
Pittsburgh, Cincinnati & St. Louis			
Pittsburgh & Columbus Division	E. Pierce		Dennison, Ohio.
Pittsburgh & Columbus Division		James McGee	Steubenville, Ohio.
Little Miami Division		M. P. Ford	Columbus, Ohio.
Little Miami Division	J. H. Setchel		Pendleton, Ohio.
Col., Cin. & Ind. Division	Robert Curtis	Tho. Chamberlain.	Columbus, Ohio.

Railroad.	Master-Mechanic.	Master Car-Builder.	Residence.
Col., Cin. & Ind. Division	W. H. Purdy	W. H. Purdy	Logansport, Ind.
Peoria & Rock Island	Theo. Mosher		Peoria, Ill.
Pittsburg, Fort Wayne & Chicago	S. M. Cummings	John Marquis	Alleghany, Pa.
Pittsburg, Fort Wayne & Chicago	J. M. Boon		Fort Wayne, Ind.
Pittsburg, Fort Wayne & Chicago		J. J. Kirkland	Crestline, Ohio.
Pittsburg, Washington & Baltimore	W. H. Harrison	J. M. Rutter	Connellsville, Pa.
Peoria, Pekin & Jacksonville	R. F. Hurd	R. F. Hurd	Pekin, Ill.
Peninsular	T. G. Templeton		Battle Creek, Mich
Portland & Rochester	John G. Brady	John G. Brady	Portland, Me.
Portland & Kennebec	John Ellis	J. W. Trussel	Augusta, Me.
Portland & Oxford Central	Geo. W. Battles	Geo. W. Battles	Buckfield, Me.
Portland, Saco & Portsmouth	John Donnell		Portland, Me.
Port Royal			Beaufort. S. C.
Port Hope, Lindsay & Beaverton	H. G. Taylor	H. G. Taylor	Port Hope, Can.
Port Huron & Lake Michigan	R. C. Stewart	R. C. Stewart	Port Huron, Mich.
Providence, Warren & Bristol	Rufus Smith	J. Brightman	Bristol, R. I.
Portsmouth, Gt. Falls & Monmouth	James Tucker	E. Fall	Union Village, N.H.
Petersburg & Weldon	R. B. Andrews	Alex. Wright	Petersburg, Va.
Providence & Worcester	Joseph Kelly	Olney L. Smith	Providence, R. I.
Poughkeepsie & Eastern	John L. Driscoll	John L. Driseoll	Poughkeepsie, N. Y.
R			
Raleigh & Gaston	J. B. Gayle	J. B. Gayle	Raleigh, N. C.
Richmond, Fredericksburg & Potomac	H. Kuhn	W. H. Trainham	Richmond, Va.
Richmond, Danville & Piedmont	John McFarland	H. Longest	Richmond, Va.
Richmond & Petersburg	John O'Brien	J. J. Martin	Richmond, Va.
Richmond & York River	C. H. Harris	J. L. Thompson	Richmond, Va.
Rome, Watertown & Ogdensburg	Wm. Jackson	H. H. Sessions	Rome, N. Y.
Reading & Columbia	B. Van Lew		Columbia, Pa.
Rome, Georgia	O. W. Harbin	O. W. Harbin	Rome, Ga.
Rochester & Genesee Valley	M. E. Brown	M. Wilder	Buffalo, N. Y.
Rockford, Rock Island & St. Louis	J. F. Nolte		Beardstown, Ill.
Rutland	N. L. Davis	Frank Sessious	Rutland, Vt.
S			
San Francisco & San José	R. B. Bishop	Frank Bellisle	San Francisco, Cal.
St. Croix & Lake Superior			New-York City.
St. Croix & Penobscot	Edward Bolton	A G. Page	Milltown, Me.
St. Lawrence & Ottawa	Calvin Dame	Calvin Dame	Prescott, Canada.
St. Louis & Iron Mountain	O. A. Haines	Oscar Doolittle	Carondelet, Mo.
St. Joseph & Denver City	E. Sleppy		Elwood, Kan.
San Antonio & Mexican Gulf	W. T. Bingham		Victoria, Texas.
South Side of Long Island	A. P. Doane	M. Heitzman	Williamsburg, L. I.
St. Paul & Sioux City	Jas. G. Butterfield		Shakopee, Minn.
St. Louis, Vandalia, T. Haute & Ind.	C. R. Peddle	H. Kirmse	Terre Haute, Ind.
South-Carolina	W. B. Smith	John Reed	Charleston, S. C.
South & North-Alabama	Tho. Jeffries	Tho. Jeffries	Lime Station, Ala.
Southern Central	Chas. G. Brown	H. Mooney	Auburn, N. Y.
Southern Minnesota	Wm. Lininger		Wells, Minn.
Southern of Canada	Albert Congdon	Albert Congdon	Fort Erie.
South-Western of Georgia	C. D. Wall		Columbus, Ga.
South-Western of Georgia	D. M.Gogul	James A. Knight.	Macon, Ga.
South Shore	Warren E. Ray		Cohasset, Mass.
Stanstead, Shefford & Chambly	W. H. Smith	M. Sessions	Waterloo, C. E.
Schuylkill & Susquehanna	John E. Wootten	John E. Wootten	Reading, Pa.
Seaboard & Roanoke	J. B. Pendleton	J. B. Pendleton	Portsmouth, Va.
Stonington & Providence	J. H. Anderson	J. H. Anderson	Providence, R. I.
Selma & Gulf	Wm. T. Daughtrey		Selma, Ala.
Selma, Rome & Dalton	A. G. Maynes	W W. Peirce	Selma. Ala.
Sioux City & Pacific	Charles Foster	J. R. Dow	Missouri Val., Iowa.
Spartanburg & Union	J. N. Benner	Jacob Rice	Union C. H., S. C.
Sheboygan & Fond du Lac	— Patterson	J. H. Erwin	Sheboygan, Wis.
Sullivan & Erie			Tonawanda, Pa.
Syracuse & Binghamton, N. Y	B. G. Merrill	B. G. Merrill	Syracuse, N. Y.
Sycamore & Cortland			Sycamore, Ill.
St. Louis & South-Eastern	L. B. Salisbury		Mt. Vernon, Ill.
St. Louis, Kansas City & Northern	John E. Calhoun	C. S. Buck	St. Louis, Mo.
T			
Taunton Branch.			Taunton, Mass.
Tioga	Peres Bonny	D. H. Stratton	Blossburg, Pa
Texas & New-Orleans	R. B. Baer		Houston, Texas.
Tennessee & Pacific	William McKeand.	William McKeand.	Nashville, Tenn.
Toledo, Wabash & Western	W. F. Ray		Fort Wayne, Ind.
Toledo, Wabash & Western		David Hoit	Toledo. Ohio.
	T. G. Gorman		Springfield, Ill.
Toledo, Peoria & Warsaw	A. H. De Clerq	R. M. Hemphill	Peoria, Ill.
Troy & Boston	Foster Church	R. V. Coon	Troy, N. Y.
Toronto, Grey & Bruce.			Toronto, Can.
U			
Union Pacific	I. H. Congdon	Geo. E. Stevens	Omaha, Nebraska.
Utica & Black River	Wm. E. Granger	David James	Utica, N. Y.
Utica, Chenango & Susquehanna	C. H. Brown		Utica, N. Y.
V			
Vicksburg & Meridian	Jas. B. Brown		Vicksburg, Miss.
Vineland			Vineland, N. J.
Vermont Central	J. M. Foss	Milton Sessions	St. Albans, Vt.
Vermont & Massachusetts	D. T. Davis	Jacob Marsh	Fitchburg, Mass.
W			
Wicomico & Pocomoke			Berlin, Md.
Wilmington, Charlotte & Rutherford	W. A. Gill	Thomas Myers	Laurenburg, N. C.
Wilmington, Columbia & Augusta	George Hall	W. J. Calais	Wilmington, N. C.
Westchester & Philadelphia	John Moyer	N. Pawling	Philadelphia, Pa.
Wilmington & Weldon	John Bissit	John Bissit	Wilmington, N. C.
Wilmington & Western			Wilmington, Del.
West-Jersey	W. McAllister	C. C. Williams	Camden, N. J.
Western Maryland	R. V. Dohoney	J. H. Nussear	Union Bridge, Md.
Winona & St. Peter	F. C. Ford	H. L. Preston	Winona, Minn.
Western North-Carolina	E. H. Marsh	E. H. Marsh	Salisbury, N. C.
Western R. R. N. C	M. W. Atkinson	M. W. Atkinson	Fayetteville, N. C.
West-Feliciana	R. C. Brower		Woodville, Miss.
Western & Atlantic	John H. Flynn	John Sherman	Atlanta, Ga.
Worcester & Nashua	George H Griggs.	George H. Griggs.	Worcester, Mass.
Welland	William Wells	William Pay	St. Catharine, C. W.
Washington & Ohio	Nathaniel Hayes	Joshua Harrison	Alexandria, Va.

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FOR THE SALE OF

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OF ALL KINDS, FOR RAILWAY USES.

ALSO,

IMPORTERS, MANUFACTURERS, AND DEALERS IN EVERY KIND OF

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Anderson, J. R. & Co	Richmond, Va.
Altoona Manufacturing Co	Altoona, Pa.
Adrian Car Co	Adrian, Mich.
Arlington Car Manufacturing Co	Arlington, Vt.
Atlantic Car Works	Salem, Mass.
Barney & Smith Manufacturing Co	Dayton, Ohio.
Baker, Jackson & Co	Latrobe, Pa.
Billmeyer & Smalls	York, Pa.
Bradley, Osgood	Worcester, Mass.
Bridgeport Car Works	Bridgeport, Pa.
Brill, J. G. & Son	Philadelphia, Pa.
Bitner, George W	Pittsburg, Pa.
Buffalo Car Co	Buffalo, N. Y.
Canada Car Co	Toronto, Canada.
Canda, F. E. & Co	Chicago, Ill.
Canada Steam-Engine Co	Kingston, Canada.
Cartersville Car Co	Cartersville, Ga.
Central Car & Manufacturing Co	Jackson, Mich.
Clendenning, W. W	Montreal.
Cummings Car-Works	Jersey City, N. J.
Connellsville Machine and Car Co	Connellsville, Pa.
Detroit Car and Manufacturing Co	Detroit, Mich.
Detroit Car Works	Detroit, Mich.
Dawson Manufacturing Co	Dawson, Ga.
Dickey, Neill & Co	Toronto.
Dickson Manufacturing Co	Scranton, Pa.
Erie Car-Works	Erie, Pa.
Elmira Car-Works	Elmira, N. Y.
Fredericks & Co	Catasauqua, Pa.
Fremont Car Co	Fremont, Ohio.
Gardner, F. & Co	Carlisle, Pa.
Gill, John L	Columbus, Ohio.
Gilbert, Bush & Co	Troy, N. Y.
Goold, James & Co	Albany, N. Y.
Goodrich Car Co	Augusta, Ga.
Haskell & Barker	Michigan City, Ind.
Harrisburg Car Manufacturing Co	Harrisburg, Pa.
Heathcote, Herbst & Co	Glen Rock, Pa.
Hamilton, William & Son	Toronto.
Harlan & Hollingsworth Co	Wilmington, Del.
Indiana Car Co	Cambridge City, Ind.
Jackson & Sharp Co	Wilmington, Del.
Jackson & Woodin Manufacturing Co	Berwick, Pa.
Jones, J. M. & Co	West-Troy, N. Y.
Kimball Manufacturing Co	San Francisco, Cal.
Keith, H. T. & I. N	W. Sandwich, Mass.
Laporte Car Manufacturing Co	Laporte, Ind.
Lombard, Thomas	Augusta, Me.
Lebanon Manufacturing Co	Lebanon, Pa.
Lehigh Car Manufacturing Co	Stemton, Pa.
Litchfield Car Manufacturing Co	Litchfield, Ill.
Stephenson, John & Co	New-York, N. Y.
Michigan Car Co	Detroit, Mich.
McNairy, Claflen & Co	Cleveland, Ohio.
Murray, Dougall & Co	Milton, Pa.
McVay, Walker & Co	Braddock's Field, Pa.
Mowry Car and Wheel Works	Cincinnati, O.
Middletown Car & Manufacturing Co	Middletown, Pa.
Missouri Car and Foundry Co	St. Louis, Mo.
New-Haven Car Co	New-Haven, Ct.
Niblo, James M	Conshohocken, Pa.
Ohio Falls Car Co	Jeffersonville, Ind.
Ontario Car Co	London, Ont.
Patten Car Works	Bath, Maine.
Peabody & McDonald	Calais, Me.
Peters, Simon	Quebec.
Pittsburg and McKeesport Car Co	McKeesport, Pa.
Pittsburg Car and Locomotive Co	Pittsburg, Pa.
Portland Co	Portland, Me.
Pullman Car Co	Chicago.
Peregoy, J. H	Houston, Texas.
Quealy Car & Iron Works	Hannibal, Mo.
Ranlet Car Manufacturing Co	Laconia, N. H.
Russell & Co	Massillon, Ohio.
Sands, William L	Pottstown, Pa.
Schall, Michael	York, Pa.
Shaaber & Johnston	Reading, Pa.
Southern Car-Works	Independence, La.
South-Western Car Co	Jeffersonville, Ind.
Shoenberger & Bryant	Duluth, Minn.
Seath & Hager	Terre Haute, Ind.
Taunton Car Co	Taunton, Mass
Tredegar Co	Richmond, Va.
Tiffin Car-Works	Tiffin, Ohio.
Vigo Foundry and Terre Haute Car-Works	Terre Haute, Ind.
Wharton, Thomas J	Brunswick, Ga.
Whittaker, Phillips & Co	Toledo, Ohio.
Wason Manufacturing Co	Springfield, Mass
Weimer, P L & Bros	Lebanon, Pa.
Wyoming Valley Manufacturing Co	Wilkesbarre, Pa.
Wells, French & Co	Chicago, Ill.
Wilmington Car-Works	Wilmington, Del.

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Albany Car-Wheel Works	Albany, N. Y.
American Paper Car-Wheel Co	Pittsford, Vt.
Atlantic Iron-Works	Portsmouth, Va.
Baltimore Car-Wheel Foundry Co	Baltimore, Md.
Barnum & Richardson Manufacturing Co	Chicago, Ill.
Barney & Smith Manufacturing Co	Dayton, Ohio.
Bass & Hanna	Fort Wayne, Ind.
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Detroit Car-Wheel Works	Detroit, Mich.
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Harrisburg Car Manufacturing Co	Harrisburg, Pa.
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Jackson & Woodin	Berwick. Pa.
John L. Gill	Columbus, Ohio.
Lobdell Car-Wheel Works	Wilmington, Del.
Louisville Car-Wheel & Railway Supply Co	Louisville Ky.
Middlebrook & Mack	Oswego, N Y.
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Moore Elastic Car-Wheel Co	Jersey City, N. J.
Mowry Car and Wheel Works	Cincinnati. Ohio.
Ohio Falls Car Co	Jeffersonville, Ind.
Pettengill, Glass & Co	Cleveland, Ohio.
Quealey, W. J	Hannibal, Mo.
Ramapo Wheel & Foundry Co	Ramapo, N. Y.
Rutland Foundry & Machine Co	Rutland, Vt.
Sterling Car-Wheel Foundry	Columbus, Ohio.
Scoville, J. & N. C	Buffalo, N. Y.
St. Louis Car-Wheel Co	St. Louis, Mo.
Taylor Iron Works	High Bridge, N. J.
Thompson, Duglas	Bordentown N. J.
Tredegar Company	Richmond, Va.
Toronto Car-Wheel Co	Toronto, Can.
Washburn, Hunts & Co	Jersey City, N. J.
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Whitney A. & Sons	Philadelphia, Pa.
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Baldwin Locomotive Works	Philadelphia, Pa.
Brooks Locomotive Works	Dunkirk, N. Y.
Danforth & Cooke	Paterson, N. J.
Dawson & Baily (light locomotives)	Pittsburg, Pa
Dickson Manufacturing Co	Scranton, Pa.
Grant Locomotive Works	Paterson, N. J.
Hinckley & Williams	Boston, Mass.
Manchester Locomotive Works	Manchester, N. H.
Mason, William	Taunton, Mass.
McKay Iron and Locomotive Works	Jersey City, N. J.
Portland Company	Portland, Me.
Porter, Bell & Co. (light locomotives)	Pittsburgh, Pa.
Pittsburg Locomotive Works	Pittsburg, Pa.
Rogers Locomotive Works	Paterson, N. J.
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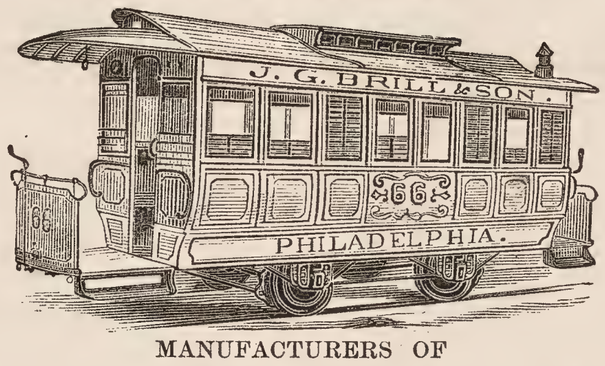

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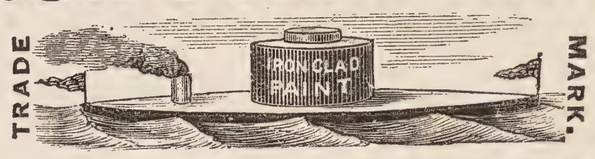

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This Company owns and manufactures under WM. GREEN'S several patents, and is the only Company in the world that makes Paint from pure hard Lake Superior Iron Ore, such as is used in furnaces for making Pig Iron.

The most Economical, Most Fireproof, Most Waterproof, Most Durable, and Most Useful Paint made.

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Purchasing Agent L. S. & M. S. R. R.

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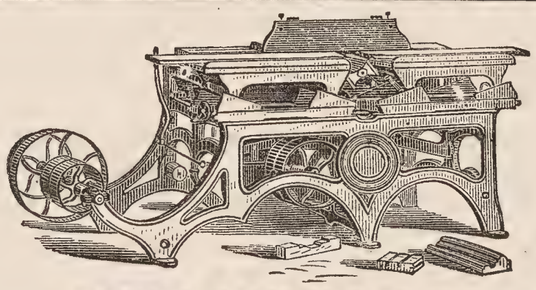

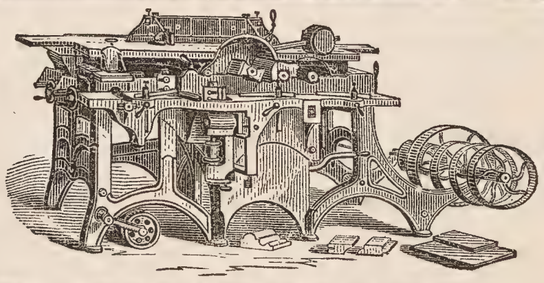

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Wearing Body.—For finishing, or last coat on railroad cars, coach bodies, and all work exposed to the weather. Works free under the brush, flows down smoothly, has a brilliant gloss, and is very durable.

Wearing Body, Quick Drying.—Is used for the same purposes as the Wearing Body.

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Coach Painters' Japan.—Is used as a dryer in varnish, paints, oils, etc., will not curdle, but mix readily, and is a strong dryer.

Black Asphaltum.—Is used for smokepipes, iron railings, castings, hardware, saddlery, and iron work generally.

Polishing, Quick Drying, Extra Light Shade.—For the inside work of railroad cars, for pianos, light furniture, etc., etc.

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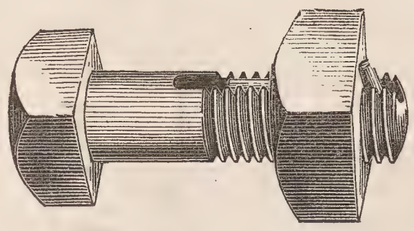
Manufacturers of all kinds of BOLTS, for FISH-PLATES, CARS, BRIDGES, MACHINERY, CARRIAGES, &c., with the

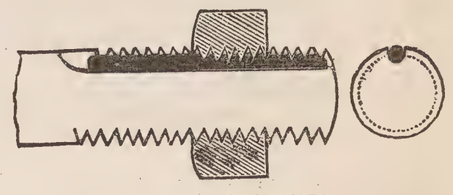


"CUMMING NUT-LOCK,"

Patented

June 16, 1868,

August 23, 1870.



SECTIONS.

Unequaled for CHEAPNESS, SIMPLICITY & EFFECTIVENESS.

This simple device, as will be seen by the engravings, consists of a groove being cut in the threaded part of a screw bolt into which is placed a key of copper wire, or other soft metal; when the nut is screwed on, it cuts a thread on the key, thereby making it impossible for the key to get out until the nut is taken off. When the nut is screwed up to its place, that part of the key over which the nut has passed is riveted up against the nut with a small punch, destroying the thread on the key. The nut, therefore, can not move backward until force is used, as with a wrench.

The groove can be rapidly cut with a simple machine designed for the purpose.

Experience has proved this device absolutely reliable, and it is the cheapest of all known devices for the purpose. By its use, old bolts on which the nuts have become too slack for use can be made as good as new, making it a great saving to railroad companies and others in that item alone. It is cheaper than a check-nut.

If the bolt should become slack from shrinking of timber or other causes, *the nut will always remain firmly attached to the bolt*, and, with the wrench, can be screwed up *any distance*, and the wire riveted up any number of times, or can be taken off without injury to the nut or bolt.

This is the only method in use that locks the nut firmly to the bolt without regard to place or surroundings, all others require some attachment that holds the bolt in its position, and a washer or other attachment to keep the nut from turning.

DIRECTIONS FOR USE.—Place the copper key in the slot, pointed end out, and beveled side up, in such a position that when the nut is screwed to its place about three-eighths of an inch of the key will project beyond its outer face. Then screw the nut to its place *over the key*, allowing it to cut its own thread in the copper. Then take a narrow flat set punch, and rivet the projecting part of the key *solidly* against the outer face of the nut. To tighten the nut: screw it up, and rivet the key tighter. To remove the nut: simply apply the wrench and unscrew the nut. It will cut its own way out through the copper. The same key can be used several times, by moving it outward a few threads in the slot.

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A. REICH,

Manufacturer of

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The purest Metallic Paint in Market.

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NATURAL

LUBRICATING OIL.

WEST-VIRGINIA

Oil and Oil Land Co.,

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West-Virginia Lubricating Oils,

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A SPECIALTY.

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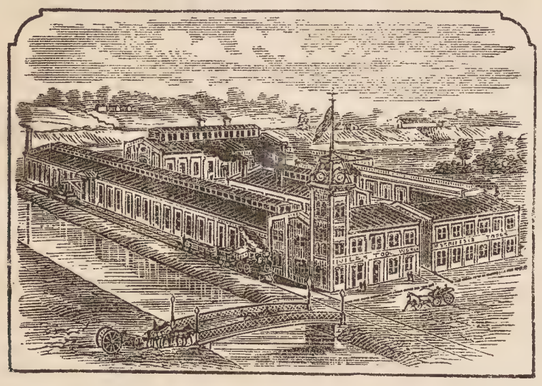
(For Finishing Outside.)

Machinists' Tools of Every Description.



We would call the attention of Railroad Companies and Car Builders to the superior excellence of our

Car Axle Lathes, (Gray's Patent,)
Car Wheel Borers,
Hydrostatic Wheel Presses, etc.

NILES TOOL WORKS,

Office, 131 West Second St., Cincinnati, Ohio.

PATENT ELASTIC FELT

For Car Seats, Mattresses, and Pillows.

ERIE AND ATLANTIC SLEEPING COACH CO.,
General Offices, 309 West 23d Street,
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F. W. BLOODGOOD, Esq., *President Patent Elastic Felt Co. P. O. Box 129, Jersey City, N. J.:*

DEAR SIR: Press of business and absence from the city has prevented me from saying to you earlier, that our experiment the past year, in using your Patent Elastic Felt for Pillows and Mattresses, in the coaches of this Company, has proved entirely satisfactory, and that I now regard it as decidedly preferable to hair and feathers. It does not pack like hair, is soft, durable, and withal cheaper. Respectfully yours,
WM. R. BARR, President.

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We invite the attention of the trade, including

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To our variety of styles of ornaments, made to match black walnut in color, and which are perfectly fitted for use where not exposed to the weather. They have been sold extensively for several years, and have given entire satisfaction—so that all who have once used them have become constant consumers. They are artistic in design and unequaled in execution, being the production of the best artists, carvers, die sinkers, and moulders.

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Also Silver-Plating and Bronzing.

N.B.—Especial attention given to plating Palace, Pullman, and Wagner Car Trimmings.

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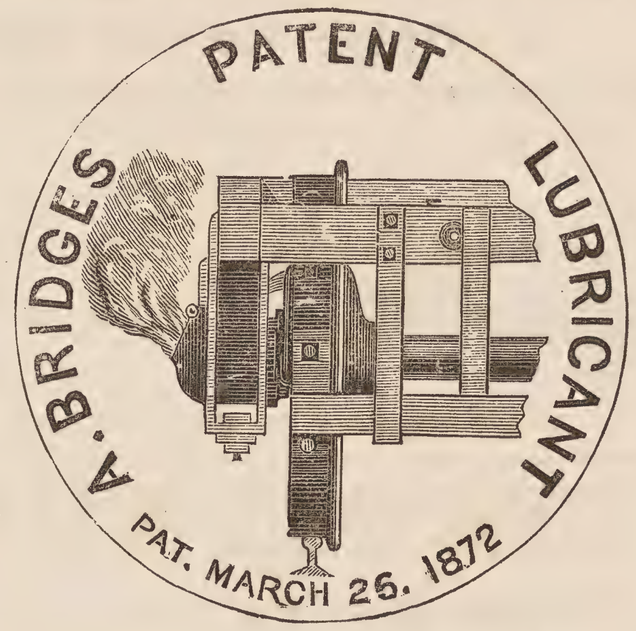
And hot journals entirely prevented by the use of



For Railroad Car Journals and other Bearings.

In presenting this Lubricant to the notice of Railroad and Steamboat Managers and Operators in Machinery generally, I do so with a practical knowledge of its merits, and with confidence that it will be found to possess invaluable qualities as a

Lubricator and Counteractor of Friction.

It has been in use, during the past two years, on a number of Railroads and Steamers, and is highly approved of.

Parties wishing to make a practical test of the Lubricant will be furnished with sample on application.

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RAILWAY SUPPLIES and MACHINERY,

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Brilliant Railroad Car Lamp, WITHOUT KEROSENE.

New Law of Massachusetts

ABOUT LIGHTING PASSENGER CARS.

A Law has passed the Massachusetts Legislature (May 29, 1872) prohibiting the use of oil below 300° fire test, instead of 110° as heretofore. The

Mineral Sperm Oil

meets the requirements of this law. It is now used by **all the Roads leading from Boston,** and by many other Roads, and by a large number of **Pullman's Palace Cars,** in the place of kerosene or candles.

THE LIGHT IS EQUAL TO KEROSENE

and the expense not half that of candles.

To use this oil in our common car lamps, now in use in all parts of the country, it is only necessary to **Change the Burner,** (costing about 50 cents per lamp.) For new lamps, in place of candles, send for lithograph and price-list. This oil is 55 cents per gallon in Boston, New-York, Pennsylvania, etc.

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Manufacturers of Car Lamps and Car Candle-Lamps, and dealers in Mineral Sperm-Oil and Car Candles.

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Denison's Patent Cooling and Lubricating Compound,

FOR COOLING HOT JOURNALS.

It will immediately cool a *hot journal* while the cars are in motion, and no journal will heat where the box is packed with it.

And Dealers in Machinists' and Railroad Supplies.

Prescott's Patent Safety Valve.

W. B. POST. C. J. POST. C. W. KALKMAN.

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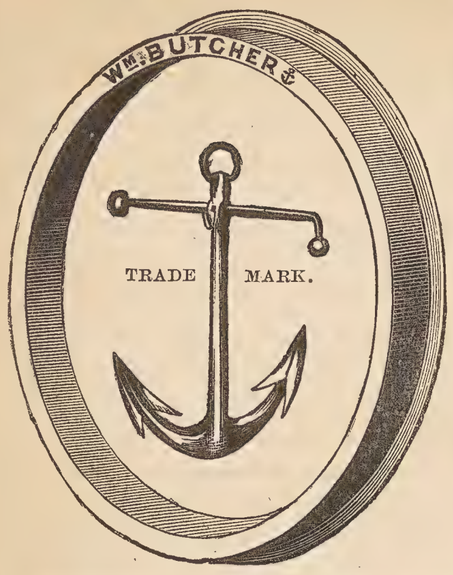

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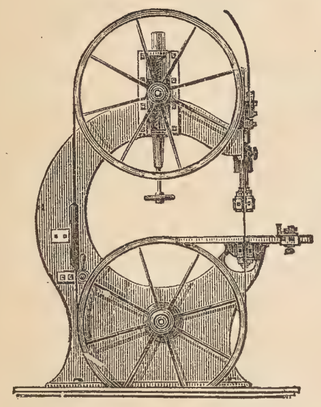

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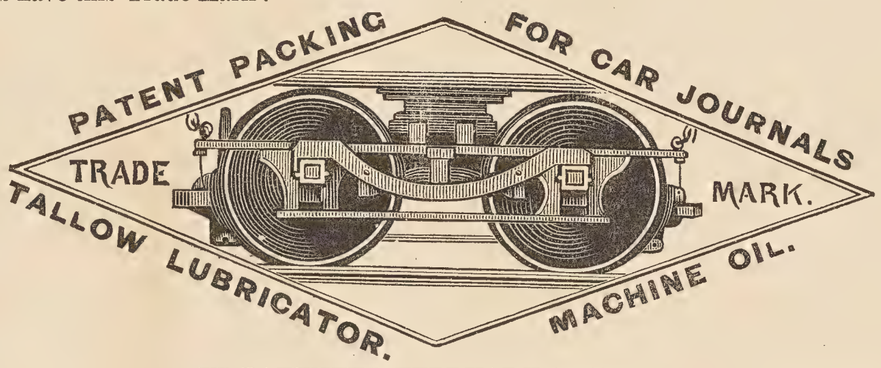

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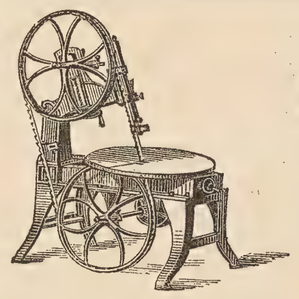

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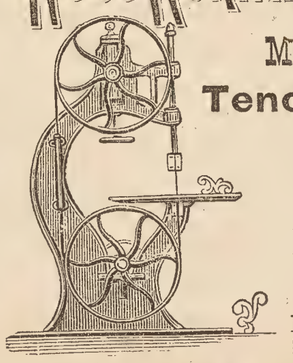

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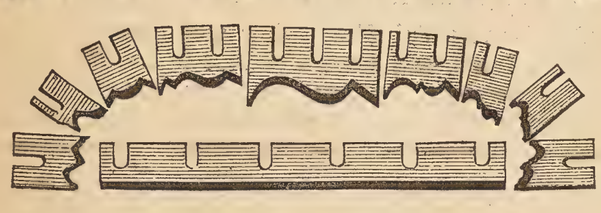

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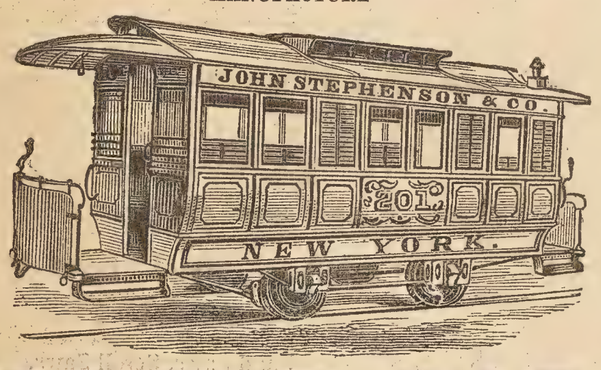

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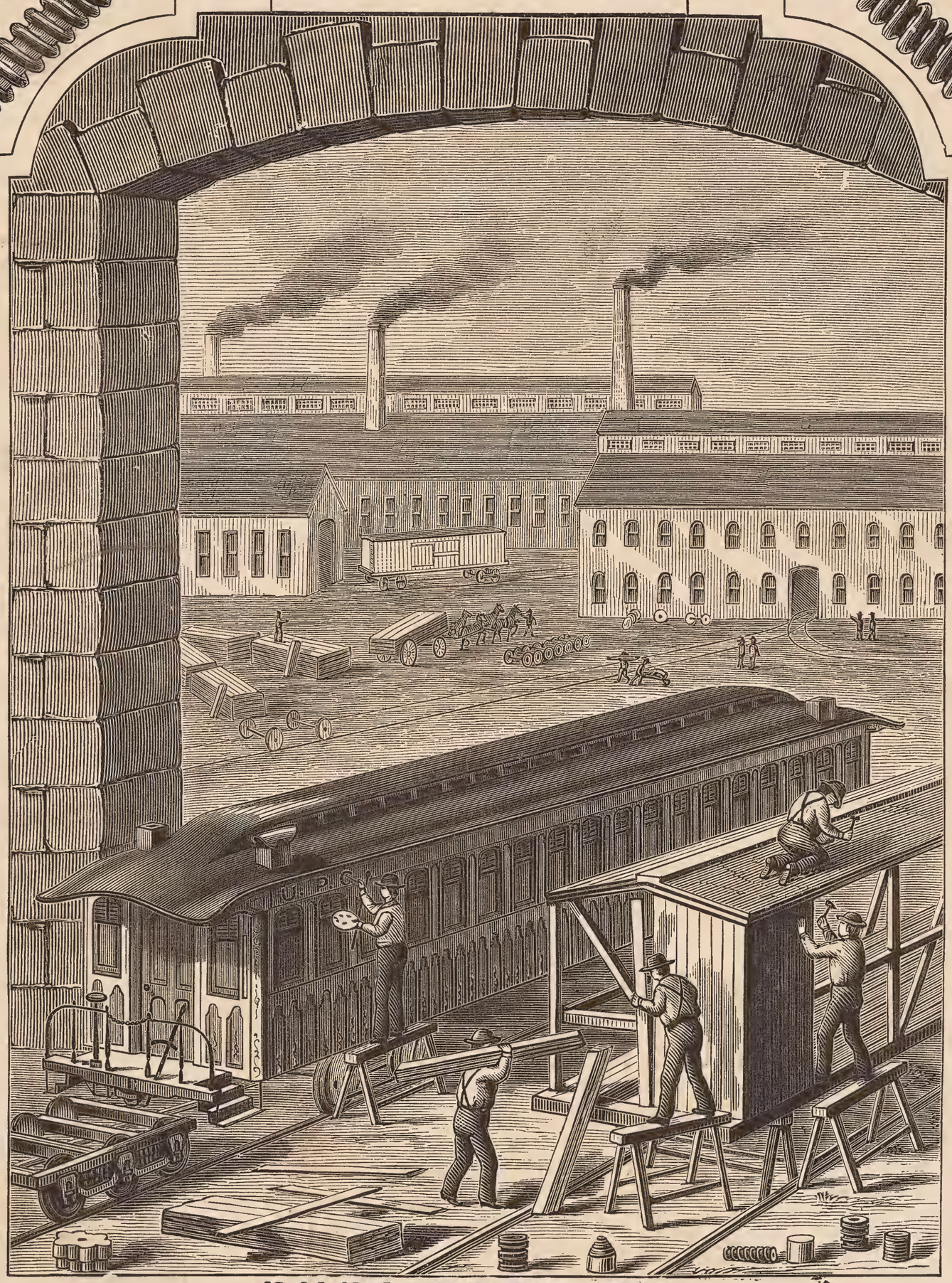

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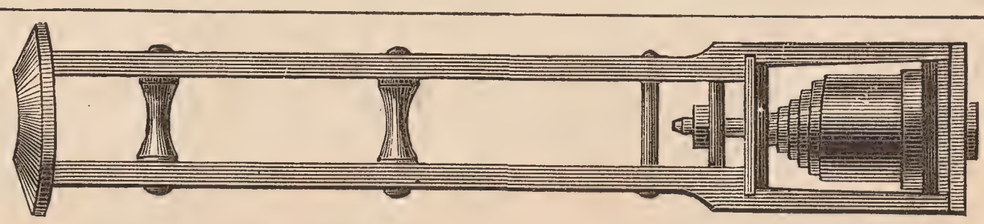

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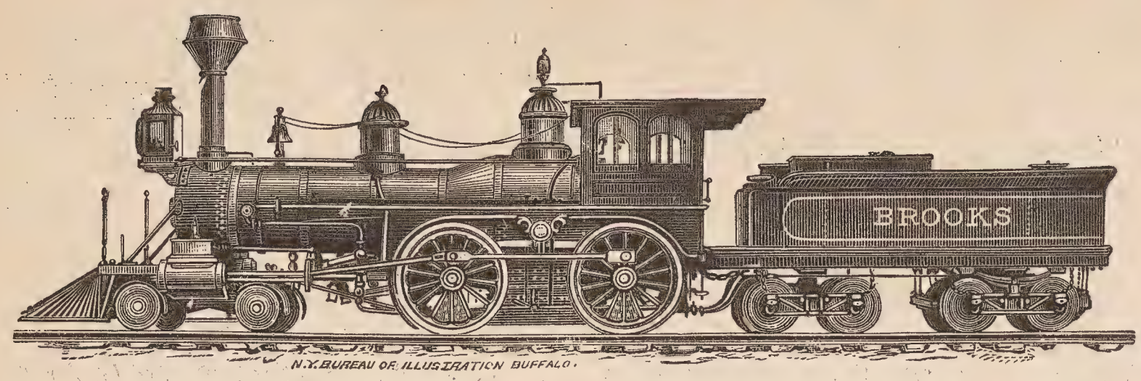

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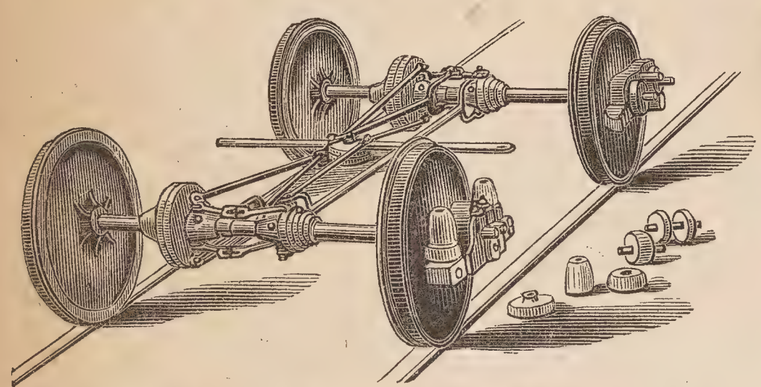

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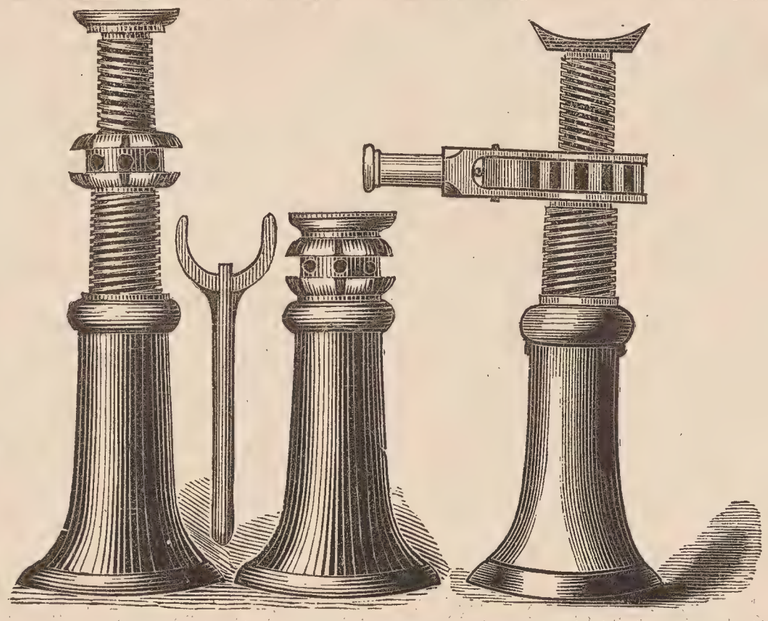

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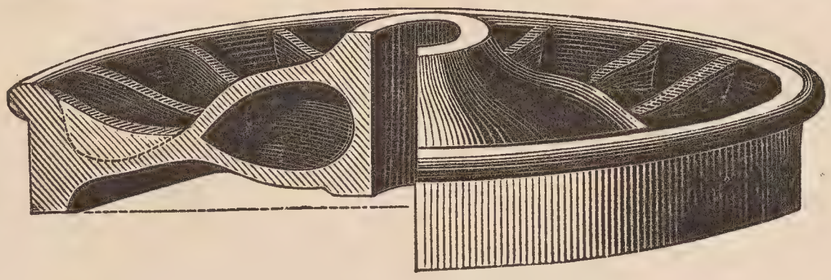

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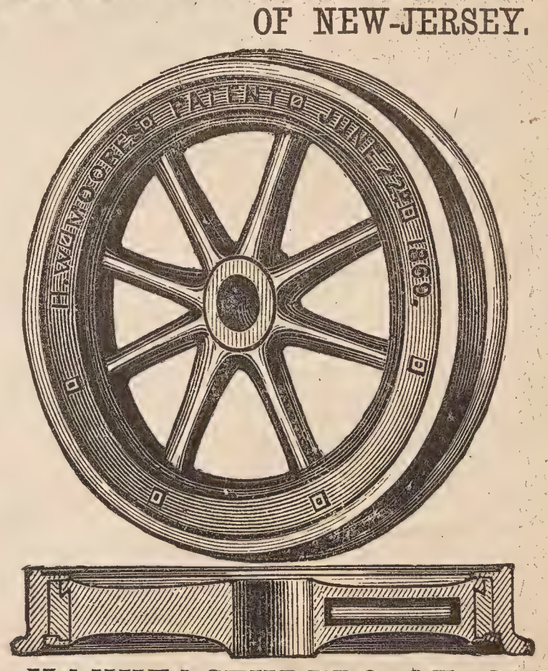

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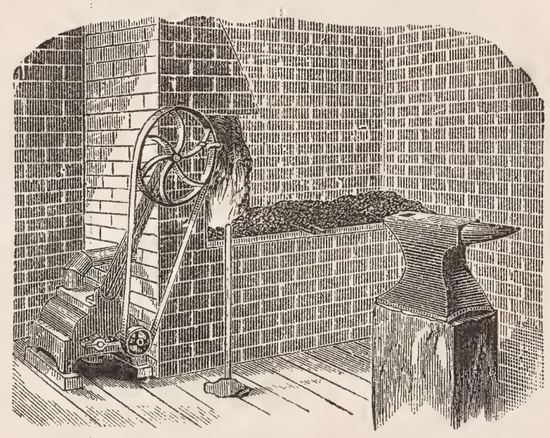

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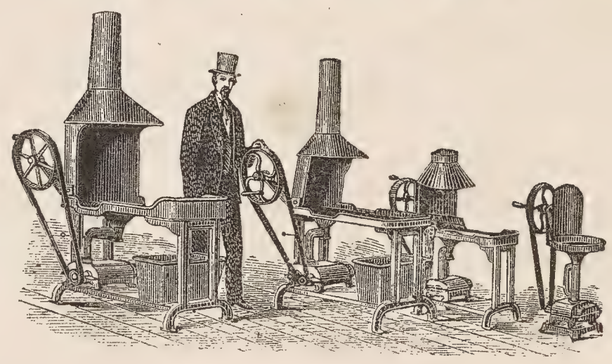
By producing a more perfect combustion, it saves a large amount of fuel, besides it occupies but a very limited space, and it ventilates the shop much better than bellows, as it takes the air from near the floor, the natural stratum of foul air.

Thus it saves *coal*, *time*, *space*, and preserves the *health*. No. 1 Blacksmith Hand-Blower will furnish ample blast for one large fire by hand or two by power.

ALSO

Patent Improved Portable Forge,

THE BEST IN THE MARKET.



Can be operated either by hand or power, and now used by many Railroads—namely, Indianapolis and St. Louis Railroad; Lehigh Valley Railroad; Central Railroad of New-Jersey; Pittsburgh and Connellsville Railroad; Camden and Amboy Railroad and Ferry Co.; Boston, Hartford, and Erie Railroad; Raleigh and Gaston Railroad, and many others.

The Forge is compact, durable, reliable, convenient, easily moved, and yet has great heating capacity, as the blast is furnished by our Blower, making it in fact the best Portable Forge in existence.

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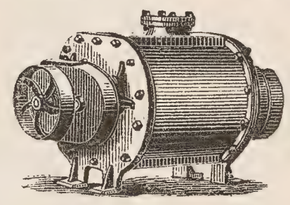

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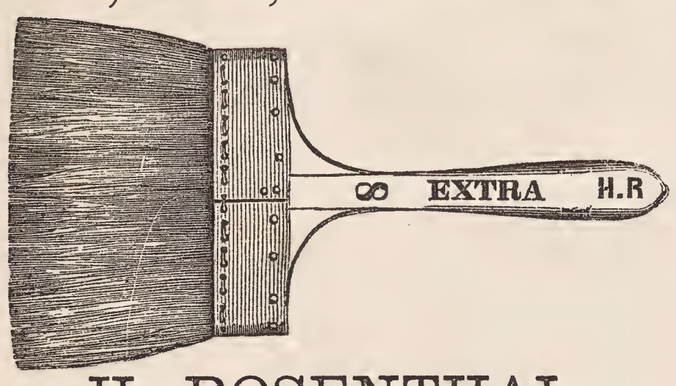

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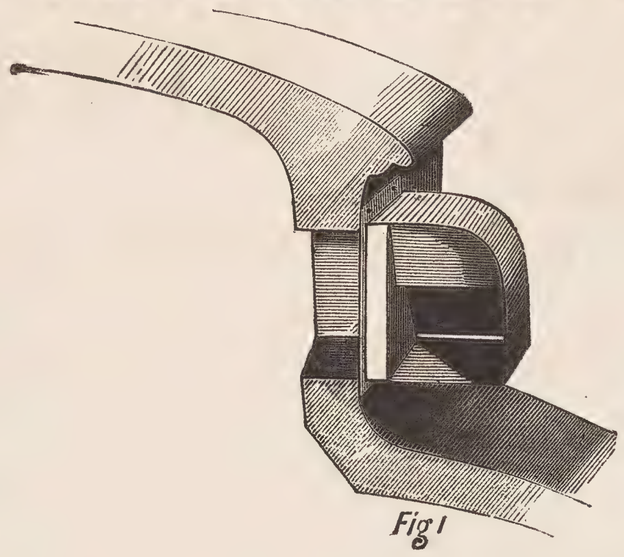

Fig 1

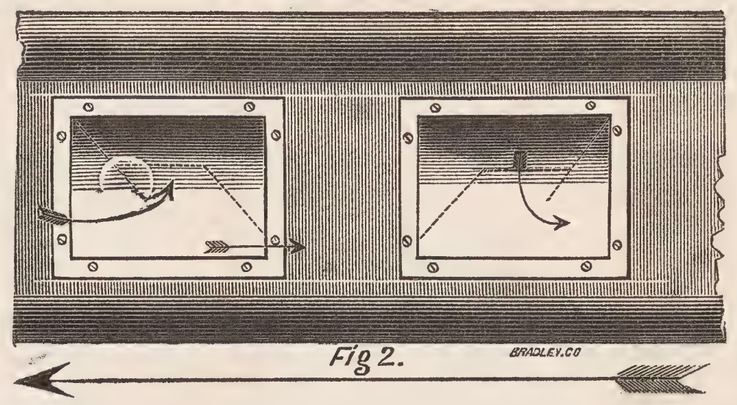

Fig 2.

THE Ventilators are placed as usual in the car roof as shown in Fig. 1, their mouths facing alternately in opposite directions, those facing forward admitting the air, and those facing backward affording an exit. Fig. 2 represents a side section of the raised roof with two of the ventilators alternately arranged. When the car is moving in the direction indicated by the arrow, it will be seen, by the curved darts, that there is an ingress and egress of air constantly taking place. The operation of the ventilators is reversed with precisely the same effect, when the car moves in the opposite direction. The internal structure is such that the dust and cinders passing into the mouth of the ventilator are intercepted by striking against two shields, shown in Fig. 1, and indicated by dotted lines in Fig. 2, and are thus naturally thrown to the bottom, where they are carried out through a small opening as shown in Fig. 1, and by the straight dart in Fig. 2, a current of pure air being forced into the car at the same time through a lateral opening. The faster the car moves, the greater is the quantity of air admitted and expelled, thus securing a free circulation which does not subject the occupants to a direct current or draught. The ventilator is also noiseless in its operation. There is no clattering of valves, and no change is necessary when the car reaches its destination. Once put in place, it is always in readiness, and runs itself independent of all employees.

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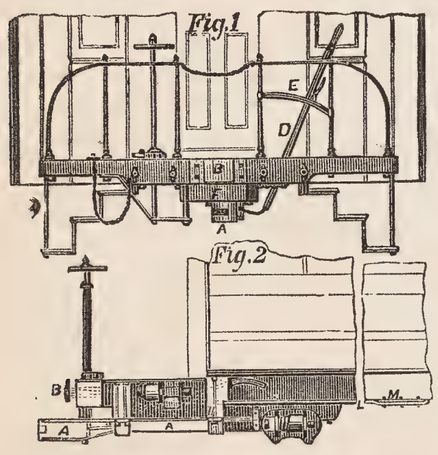

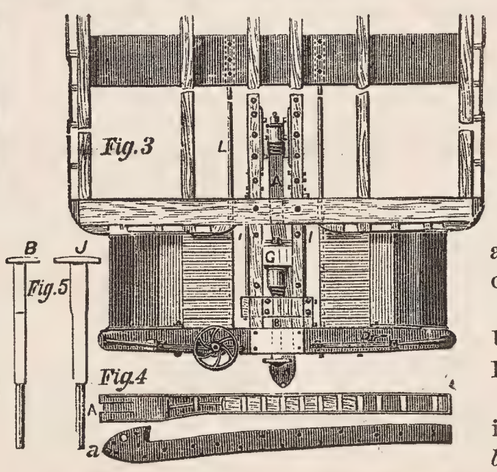

Office, 231 Broadway, (Rooms 4 and 5,) New-York.

Send for Illustrated Pamphlet, and call and see working models. E. MILLER, Patentee.

DESCRIPTION.

Figure 1 is an elevation; Figure 2, a longitudinal section; Figure 3, a plan of an end of a car to which the arrangement has been applied; and Figures 4 and 5 show top and side views of the "Hook" and "Buffer," drawn on a larger scale than that of Figures 1, 2, and 3.

The letters refer to the same parts in all the figures. A is the coupling "Hook," B the "Buffer," C the "Stop," D the "Lever," E the "Quadrant Ratchet," F the "Truss Beam," G the "Spring Beam," H the "Suspender Beam," I the "Upward Trusses," K the "Main Spring," L the "Downward Trusses," and M the "Bolster."

The Platforms, instead of being located below the centre line of the main sills of the cars, are placed *in* that ine, and held there by the Trusses I and L, so that the point of contact (in Buffers B) is *in* the said centre line and *not below* it.

The coupling "Hook" A is attached to the draw spring the same as the ordinary draw head, and at the same height above the track, but in such a manner that the outer end is free to move laterally for a short distance. The Coupling Hook projects beyond the platform. The Stop C is placed under the Buffer Beam to prevent accidental uncoupling. When two cars are brought together, the Coupling Hooks, from *their shape*, push each other aside, until the Buffers B are compressed hard on the Buffer Springs, then—*the points of the hooks having passed each other sufficiently far*—the Hooks are carried forward by their main-springs, and thus the "*Coupling*" and "*Compression*" are both effected automatically *and at the same time*, and without the use of links and pins. When two cars are thus coupled together, the *head* of the *Hook* of each car is under the Buffer Beam of its opposite car, and the platforms are close together, (about 4 inches apart.) The effect of this is, *one platform can not be forced over the other*, nor can a *child* fall between the platforms; the dust and rain are nearly all shut out; the "Compression" makes the train run steadily, and prevents all jerking at starting and stopping.

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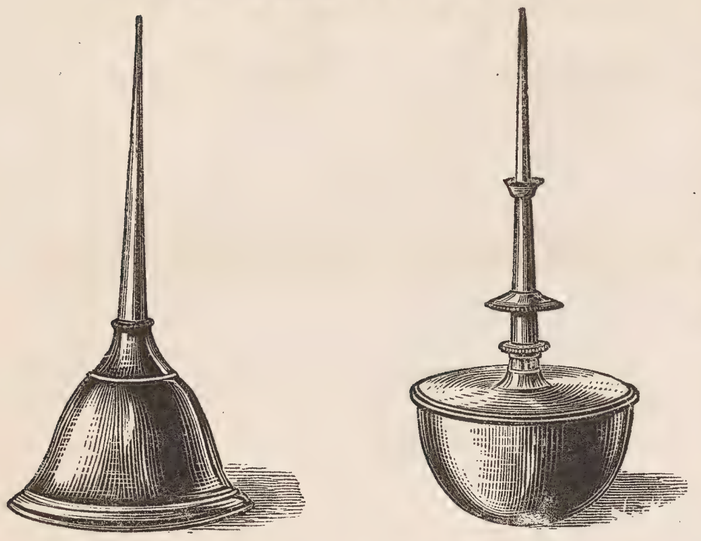

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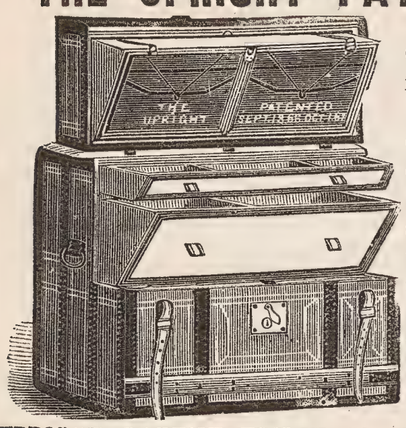

Opens without removing from the wall.

Instead of trays to lift out, it is arranged with drawers.

It is STRONGER, as only a small portion opens, whereas in the old style the whole top comes off.

Same room in bottom of the trunk for dresses as in the old style.

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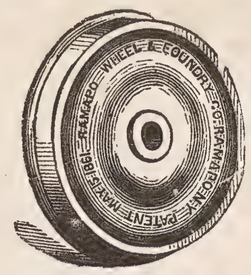

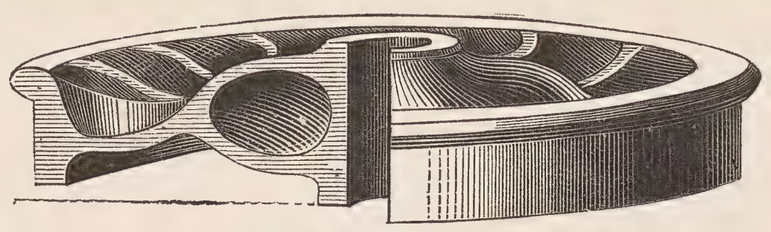

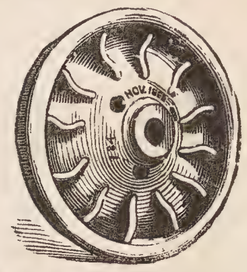

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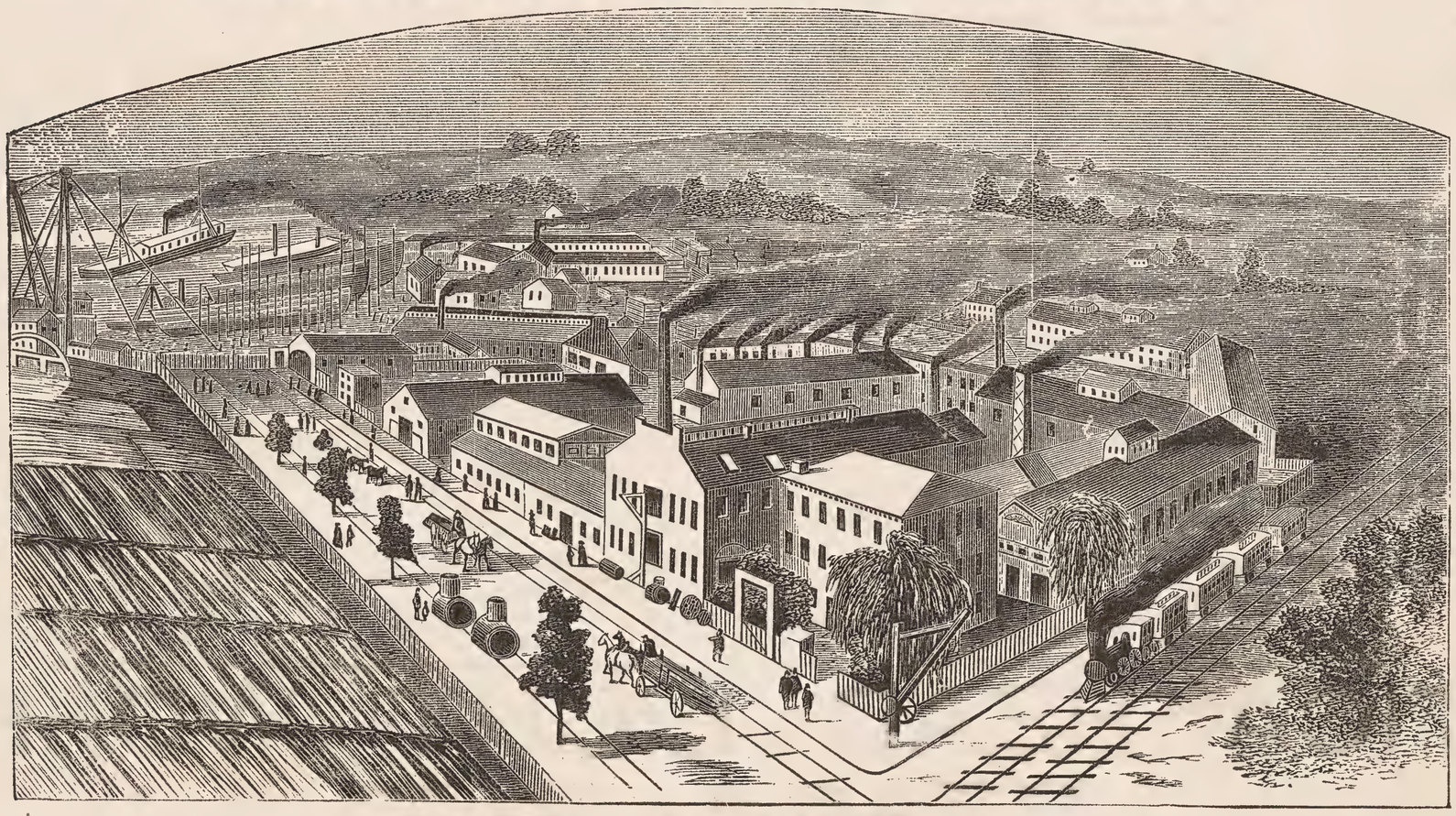

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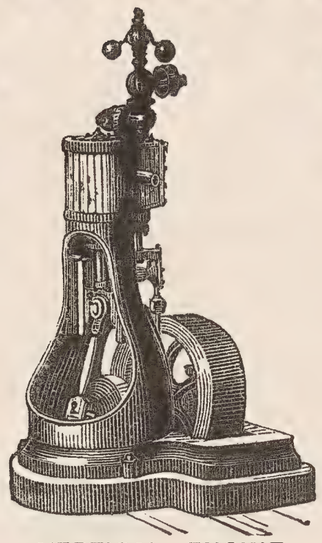

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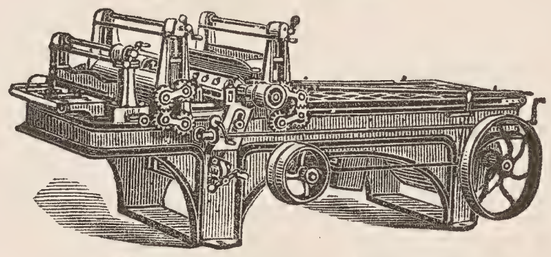

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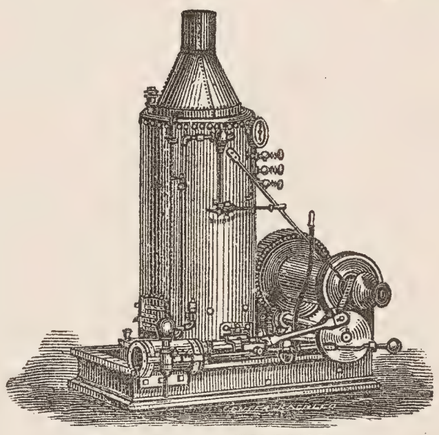

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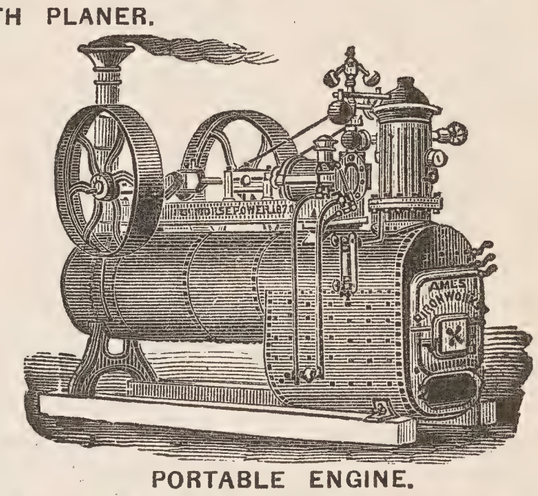

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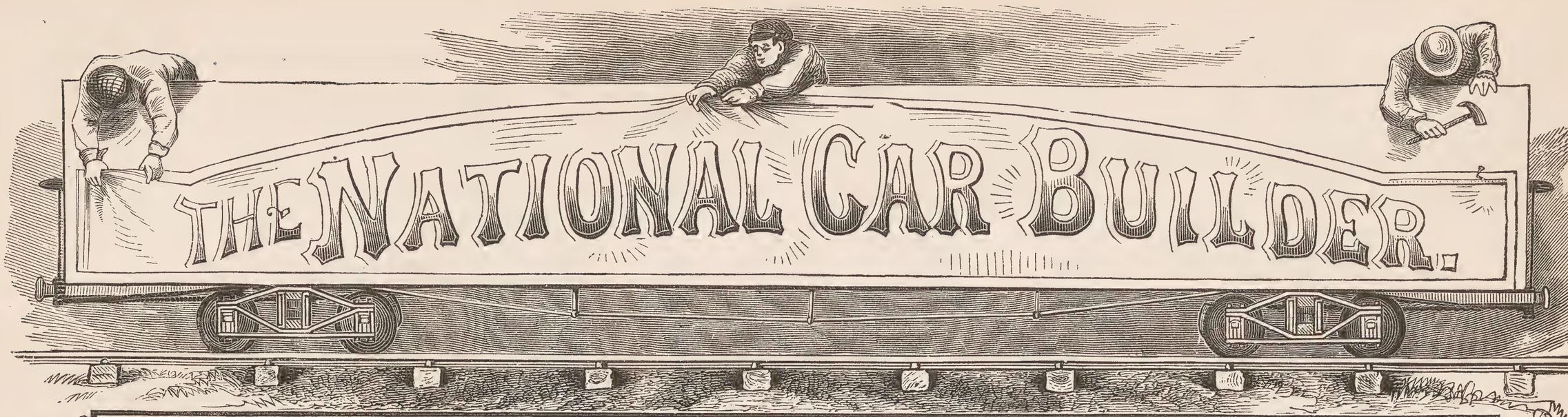
I. A. WILLIAMS, Patentee and Proprietor.

Jan 1873



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Vol. IV. No. 1. JANUARY, 1873. One Dollar per Annum. Single Copies, 10 Cents.

Don't Neglect the Circulars.

THE *Railroad Gazette*, in alluding to the interrogative circulars issued by the master-mechanics' and master car-builders' associations, makes the following remarks in regard to the importance of the information sought to be obtained, and which we commend to the attention of our readers, and especially those who are members of the associations named:

"The system which has been adopted for collecting information by these associations is certainly a very efficient one. It enables the committees, before making their reports, to interrogate every member of the association, and to learn the results of his experience regarding the subject under consideration. The information thus accumulated can be embodied in the reports, and in the mean while—and, in fact, in preparing answers to the committees—each member is obliged to give the subject more or less consideration, and has sufficient time to be able to do so, in the interval between the receipt of the circular and the annual convention. Thus authorities can be consulted, experiments made, and investigations of various kinds carried out, so that when the subject comes up for discussion those who participate in it may be prepared to do so, and not, as is so frequently the case in deliberative bodies, do little more than ventilate their ignorance.

"There is perhaps a little danger that there may be so many inquiries made and so many circulars sent to the members of the association, that the task of replying will become so great that they will disregard the whole matter. Should this be the case, it would of course lessen very materially the usefulness of these associations, and we believe those who thus neglect their duties would themselves lose much of the advantage which must necessarily result from a consideration of the subjects and the questions asked by the committees. Those who will take up these circulars, and faithfully consider the questions involved, if they have not already done so, will be surprised at the amount of information they will acquire in preparing answers to them. Besides learning that which is entirely new, they will also find that much which they knew very inaccurately and held very loosely will, or rather must of necessity, assume a clearness and distinctness which it never possessed before, and which will make it much more useful thereafter. Some witty person has said that to understand a subject it is necessary to write a book about it. Few master-mechanics, or rather railroad officers, have time to do this, but nearly all are able to reply to the questions prepared by the various committees, which is in effect writing a very small book.

"Many are doubtless deterred from making replies to the circulars on account of their inability to give answers which are satisfactory to themselves. All are liable to this, and it would require a person of vast experience and profound knowledge to answer with certainty atl the questions proposed. There are persons who are never willing to admit their ignorance. To say that such are not wise would be a mild and respectful way of asserting that they are very foolish. Now the questions which are presented for answer are usually such as the committees and the association want information about. It is therefore presumed that few of the members will be able to give answers which will be entirely adequate to supply all information desired. Therefore if a master-mechanic is unable to give a definite reply to the problems presented for solution, let him state what he does know. It often happens that a person will be able to give some very valuable information concerning some one question contained in a circular, whereas he may be quite ignorant of all the others. In such cases let him answer to the extent of his knowledge, and either remain silent, or, if he chooses, state the degree of his ignorance regarding that which he does not know."

Axles, Journal-Bearings, and Oil-Boxes.

THE following circular has been issued by the committee on the above-named subjects, appointed at the last meeting of the Master Car-Builders' Association, the said committee being instructed to embody such information as they can obtain in a report to be published in THE NATIONAL CAR-BUILDER and *Railroad Gazette*, at least three months previous to the next annual meeting.

CIRCULAR.

To Master Car-Builders:

To all practical men who are called upon to repair the "through" cars on any of our trunk lines, it is apparent that the want of uniformity in those parts which need repairs is one of the greatest obstacles in the way of forwarding freight promptly and without delay. This is especially true of those parts which are subjected to the greatest wear, and require the most frequent renewal. Probably the breakage of wheels and axles, and the heating of journals causes more delay and trouble than all the other disorders to which cars are subject. The immense yearly increase, not only in the number but in the variety of the cars with which our roads are equipped, of course increases the evil in the same proportion. The Master Car-Builders' Association, under the eyes of whose members these evils are most directly presented, have determined to make an effort to obviate the difficulty, and, with that end in view, appointed a committee at their last annual convention to carefully examine this subject, and if possible present to the next annual meeting of their association a standard form and size of axle, journal-bearing, and oil-box, adapted to the service of the largest possible number of cars now required on our roads.

The journals of car-axles now in use vary in size from 3 to 4 inches in diameter, and 5 to 8 inches in length. The committee are of the opinion that an axle of standard form and dimensions could be adopted which would fulfill all the requirements of those axles which now vary so much in size. In order that they may be able to fix upon the best form and proportions for a standard axle which will be best adapted to the requirements of the traffic of American roads, they desire that all Master Car-Builders and others interested should reply to the following inquiries:

1st. If there were no car-axles now in use, what size would you recommend for the diameter and length of journal for a standard axle for 4-feet 8½-inch to 4-feet 10-inch gauge roads?

2d. What for the diameter of the axle at the wheel-seat?

3d. What for the length of axle between the outside collars?

4th. What kind of brass bearings; flat top or centre bearing, with wedge or without wedge, (or key)?

5th. What for the diameter at the centre of the axle?

6th. Please give the committee any additional information or suggestion which you may think will be of assistance to them in making a report on this subject.

The committee also desire to collect information which will enable them to determine upon the best form and dimensions for a standard car-axle, oil-box, and journal-bearing, and to that end request you to forward to them as early as practicable, either an accurate drawing showing the construction of the standard box you are now using, or, if that is not convenient, to send a complete box and bearing fitted up ready for use. Each drawing or box sent should have the name of the road from which it came marked on it *distinctly and in full*, and not the initials only.

All communications should be addressed to Mr. F. D. Adams, the chairman of the committee.

Answers to the above questions are requested at once, to enable the committee to prepare their report as early as possible.

F. D. ADAMS, Boston and Albany Railroad, Springfield, Mass.
D. HOYT, Toledo, Wabash, and Western Railroad, Toledo, Ohio.
J. KIRBY, Lake Shore and Michigan Southern Railroad, Cleveland, Ohio.

Committee.

Interchange of Cars.

THE following circular has been issued by the secretary of the Master Car-Builders' Association:

To Railway Managers and Superintendents:

GENTLEMEN: At the annual meeting of this Association, held in the city of St. Louis on the 12th and 13th of June, 1872, the subject of the interchange of cars and the difficulty attending the adjustment of damages and cost of repairs was fully discussed, and the following report of a committee adopted. The secretary was instructed to transmit a copy of the same to managers and superintendents of railroads for their consideration and approval, and to request that the conditions and rules therein specified for such interchange of cars be adopted and adhered to by all roads during the current year, or until the next an-

nual meeting of the Association, when any amendments or modifications that may be deemed necessary can be considered and acted upon. Trusting that the importance of the subject will commend it to your earnest consideration,

I am, very respectfully, your obedient servant,

LEANDER GAREY, *Secretary.*

REPORT.

Gentlemen of the Convention : The Committee on the subject of Interchange of Cars beg leave to submit the following report:

1st. All parties interchanging cars shall keep such cars in as perfect order as possible.

2d. Any railroad company receiving the cars of other companies for the purpose of running them over its road, or otherwise using them, will be required to return the same in as good general condition as they were in when received; or if this be not done, the necessary cost of restoring them to such condition will be charged to the company so receiving, running, or using them. In order to prevent, when cars are returned, any question as to the condition they were in when they left the company's line to which they belonged, notice should be given by the company receiving them, at the time they are received, of any particular thing that may be deemed as constituting a lack of fair condition. Any repairs made to through-cars while in the use or possession of any company must be at the expense of that company; and no claims for repairs to through-cars will be allowed. An exception will be made, however, as to wheels and axles, if broken by fair usage; all companies shall pay for such new wheels or axles, less the value of the ones broken.

3d. All other repairs required, through fault of a company when the cars are being hauled over its road, are to be made by and done at the expense of such company; and cars shall be closely watched and inspected at the terminus of each road or division; and when repairs are needed, they shall be permanently and thoroughly made.

4th. Each road is to deliver the cars to connecting road in good running-order.

5th. Whenever any company repairs such cars, of whatever brand or kind, such repairs shall be made in a permanent manner, and after the style adopted by the road contributing the cars; and when castings or other parts are made, to replace those broken or lost, they are to be made the same as the originals. If forgings and buffers or other parts are made, they shall be of the style and pattern of the original in the cars.

6th. In order to give good dispatch to movement of cars, it shall be the first duty of the car-inspectors, as soon as the car arrives at a terminal station of any road, to see that it is in good running-order, and ready to deliver; and in case the delivering and receiving inspectors disagree as to the condition of a car, the case is to be immediately referred to the superintendents or their representatives.

7th. Each company is to treat such cars of other roads, when on its roads, in reference to repairs, oiling, and packing of boxes, in same manner as its own are treated.

8th. In case a car under load, in transit, has defects that do not render it unsafe to proceed on its journey before being repaired, the inspectors may make a note of such defect, and such car will be received back in same condition and may be receipted for in bad order; but all such cars shall be returned, without load, to the road on which the damage was done, for repairs.

9th. In case cars are destroyed on any other line than that to which they belong, it shall be the duty of the car-master of such road to immediately notify the car-master of the road owning such car of the date of its demolition, giving the number and style of such car or cars, and trucks, whether of wood or iron.

10th. In settling for cars destroyed on any line other than that to which they belong, the cost of the car shall be taken less the value of iron as scrap, deducting ten per cent per year for each year that the car has been in use from that amount, and the balance shall be considered the value of the car destroyed. In case the demolition does not extend to the trucks, the trucks may be returned at a proper valuation.

Respectfully submitted,
JOHN KIRBY,
Lake Shore and Michigan Southern Railway,
D. HOYT,
Toledo, Wabash, and Western Railway,
F. D. ADAMS,
Boston and Albany Railroad,
J. L. HACKATHORN,
Kentucky Central Railroad,
JOSEPH JONES,
New-York Central and Hudson River Railroad,
R. S. RAMSEY,
Pennsylvania Railroad,

Committee.

A Standard System.

EDITOR OF THE NATIONAL CAR-BUILDER:

THE American railway system is yet in its infancy. It is true that nearly forty years have elapsed since the advent of rail-cars—a comparatively short time in which to develop so grand results as we find to-day—yet rapid changes have taken place; ever advancing toward a perfect system, and reaching out for what at present seems not far distant, a national standard which will compel managers to adopt a uniformity of cars, engines, tracks, and in the manner of making up passenger-trains.

The spirit of invention and improvement, so characteristic of our nation, has been actively engaged since the opening of our railroads; and experimenting with new devices has cost us vast sums of money. But good results have followed, and though dearly bought, we have discovered the good, while the greater mass of worthless designs exist only in the scrap-piles which are to be found in the vicinity of every railroad shop. The adoption of certain improvements by one company and their rejection by another, is a fruitful source of annoyance, especially upon connecting roads; but it gives pleasure to notice that we are gradually drifting toward uniformity, and that in the gauge of tracks and weight of rails the same results are apparent.

Great changes have taken place in the construction of locomotives, and that perfection which is only attainable through years of labor and practical tests, is the cognomen of the American locomotive; beautiful in design and finish, it is a model of the skill of our master-mechanics.

In the construction of cars there is yet a chance for much improvement. Our car-builders aim to bring out their individual ideas, and often to the great disadvantage of arriving at any definite uniformity of construction. The ideas of one conflict with those of another, and this too often engenders a spirit of rivalry. We like to see a mechanic who takes pride in his own work, for no man can be a good mechanic without this qualification; but he must not be uncharitable, nor reject a good thing because he did not invent and patent it himself or control and pocket the income arising therefrom. It is gratifying to know that the budding spirit of fraternity has blossomed into full being among our car-builders, and that a society has been formed with its head-centre in this city, where meetings are to be held each month, to better promote an interchange of views and the formation of social friendship.

One of the greatest defects in car-building is the lack of properly utilizing the strength of material, the result of which can be seen at any time in the great, unwieldy freight-cars to be found on every road.

Mr. C. A. Smith, master car-builder for the Erie Railway, has now in his shop at Jersey City a car weighing 17,700 lbs., built with great strength, of the heaviest kind of timber, sills 4½ inches by 8 inches, truck-wheels 33 inches in diameter with 6 feet gauge. There is a saving of 2300 lbs. in the weight of one car, and which, by a proper use of material, is as strong and serviceable as any weighing 20,000 lbs., the usual weight. Mr. Smith has used the material where the strength is most needed, and thinks that on the usual gauge he could reduce the weight to 15,000 lbs. The great value of cars built in this manner is readily perceived, as well as the liberality of railway companies in drawing so much extra weight which they get for nothing.

In passenger-cars the great defect to overcome is weakness—their liability to "pulverize" in case of collision or other accident. The system of coupling with slack links and pins gives rise to oscillation, and this often is the cause of derailment, while the worst form of railway accident is "telescoping," which arises directly from weak platforms and a crooked line of resistance at the coupling, as is seen in the old style of draw-heads.

The great need of the present time is a standard system of making up passenger-trains—one that will combine the greatest strength of coupling, be the easiest to couple, present the most perfect resistance to blows, and make the platform safe for passengers passing from one car to another. For the accomplishment of all this, Colonel Ezra Miller, after many years of experimental testing and close study, perfected his present platforms, and to-day they are in use upon over two hundred roads, and saving the lives of hundreds annually. There is no doubt of the truth of this assertion, as facts amply prove; but while it is a life-saving appliance, it is also property-saving beyond all computation. Railroad managers who have had these platforms in use for any length of time, consider them of the greatest value in preserving their cars from destruction in time of accident, and would not run a road without them. We believe them to be the great essential of American cars, and that no passenger-cars ought to be run without them; that by their universal adoption, a national system would be established which would render our passenger-trains the safest in the world. Let us hope that this will ultimately be the result.

CAMBER.

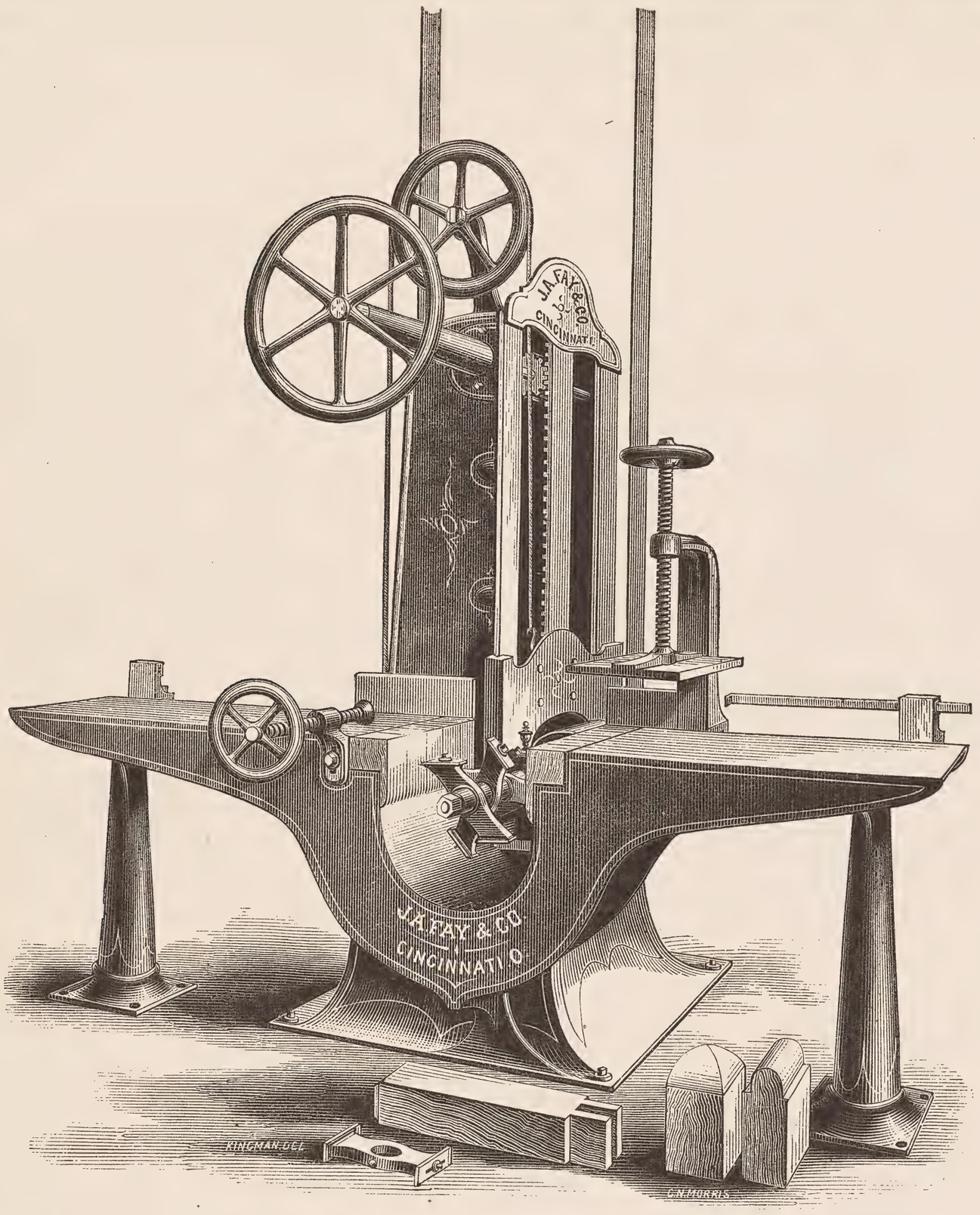
The First Railroad.

THE following interesting railroad statistics are condensed from an article in Poor's *Manual of the Railroads in the United States:*

"The first railroad undertaken in the United States was in 1830, by the Baltimore and Ohio road. For the first two years, it was worked by horse-power, there being 23 miles in operation. The largest amount of mileage built in any one year was in 1871, when 7453 miles of new road were built, making the total number of miles in operation throughout the country 60,852. The State having the most miles of railroad in proportion to area is Massachusetts, which has one mile of railroad to every 4.86 square miles of territory. A similar ratio would give this State about 10,000 miles of railroad, or twice as much as at present. The average cost of construction has been $50,000 per mile, which gives a total for the 60,852 miles of $3,042,600,000 invested in railways; which estimate includes the equipment as well as the building of the roads. The cost of mileage construction for the past year was about $225,000,000, while some $50,000,000 was expended in new works and equipments on old roads, giving a total expenditure for the year of $275,000,000. The average weight of rails for the whole country was 2500 tons per mile of road; while the tonnage of Pennsylvania was 12,000 tons per mile, being the largest average of any one State. The total earnings of the railways in the United States for the year was $39,466,358, or over twelve per cent of capital invested."

SUCCESSFUL experiments have been recently made on the North-London (England) railroad of a new brake worked by electricity. The invention consists in the application of electro-magnets, exerting a force of 600 pounds to pulleys on a swing-shaft underneath the carriages. By merely pressing a key, the guard is enabled to bring the train to a stand-still.

Jan. 1873



Vertical Car-Tenoning Machine.

THE engraving represents a machine for cutting tenons, and of special service to car-builders and other workers of heavy timber. It has been recently designed and perfected by Messrs. J. A. Fay & Co., of Cincinnati, manufacturers of wood-working machinery, and who have lately introduced a number of novel and labor-saving tools for car-builders' use.

This machine is designed for tenoning heavy timbers, sills, etc., used in car construction, bridge and ship-building, and will cut single, double, or triple tenons, as may be desired. It is also adapted to a great variety of work heretofore performed by hand, such as rabbeting, cornering, and rounding ends of timber, and in its various uses can be made to save the labor of forty men. It has a very heavy iron frame and table, and is constructed throughout in the most substantial and durable manner. It is provided with three adjustable cutter-heads made of gun-metal, which are attached to a steel spindle 2½ inches in diameter and running in long, self-oiling bearings. This spindle is attached to a traveling head which moves vertically to the required height or depth in a planed upright by means of a rack-pinion and hand wheel, as shown in the cut. The tenons can be cut upon timbers of any length without the necessity of turning them round. When the cutter-heads are passed down through one end, the timber is pushed along to the other side of the table, and the cutter-heads passed up through the other end, thus completing the work. The jaws of the table are made of wood, and are adjustable so as to prevent the splitting of the timber as the cutters pass through, and also to avoid striking against the iron table in passing up and down. The machine is belted overhead, and the belt is kept at a proper tension by means of a binder-pulley over which the belt runs, and which raises and lowers in the same degree as the cutter-heads are traversed up or down. The machine is well adapted in all its parts to the work it is intended to perform, and in practical use will be found safe, reliable, and complete. It should be introduced in every car-shop, where its merits can not fail to be appreciated, and its service found to be indispensable.

Any further information may be obtained by addressing the manufacturers as above, at Cincinnati, Ohio.

Lubricating Oil.

THE *American Chemist* says a very elaborate series of experiments were recently made in New-York to test the relative value of different lubricators. The experiments were continued during a period of fourteen months. The following were the general results and inferences: The consumption of oil varies with its temperature when applied. Winter sperm sustained the heaviest pressure, and was taken as the initial of comparison for all others, and their percentage of lubricating value determined by it. The tests of mineral oils and mixtures of animal and fish-oils with them would not sustain an equal pressure with the sperm, when equal quantities of the oil were applied, without rapidly increasing the temperature of the journals, and producing an abrasion of their surfaces. When the pressure on the bearings was made equal with winter sperm, it required from 100 per cent to 400 per cent increase of oil to keep the temperature of the journals below 100 degrees Fahr. Experiments were made at varied velocities with the same oils. The results proved that as the velocity was reduced the pressure could be increased, and the relative consumption of oil, applied at equal temperatures, was decreased in almost equal ratio.

Car-Shop Notes.

THE ERIE RAILWAY SHOPS AT BUFFALO.

THIS being the principal western terminus of the line, and the track having a gauge of six feet with no connections of a similar gauge, a transfer of all traffic at this point is unavoidable. The great number of cars which accumulate daily have to be inspected and overhauled before they are reloaded and returned. To do this work with dispatch, a large force of men are constantly employed and quite extensive works are kept in operation. The car-shop proper is a substantial frame building, 66x336, with two tracks running lengthwise. About one half the length of one track is partitioned off and used for painting and finishing passenger-cars. At one end of the main building is a wing occupied by the wood-working machinery, which is, however, inadequate to the work required to be done. Requisitions have been made for additional machinery, which will, when received, make this department equal to many so-called first-class shops. Continuous with the main building are the iron machine and blacksmith-shops, the latter containing 13 fires and a power trip-hammer. This department is under the direction of Mr. H. Petford, whose ingenuity and skill in devising numerous valuable and labor-saving contrivances entitle him to the appellation of a genuine Yankee. Among these we noticed a set of forms for making coupling-links and pins, one for shaping and welding the links, another for cutting and pointing the pins, and a third for forming the heads. These forms resemble a large pair of tongs with a square, flat piece of iron on each point. In these irons is the mould or form of the pin or link, into which one is placed and subjected to about three blows of the trip-hammer, and the work is done. To make the pins, the iron is cut long enough for two, and a head formed on each end with eye for chain; then it is heated at the centre, placed in the form, and comes from under the hammer with the two pins pointed perfectly. Only two men are required to do the work, and by these means can make ten pins or links while one could be made by hand in the old way.

The work on hand at the time of our visit consisted of two first-class passenger-cars and one baggage-car, which were undergoing general repairs and painting, and when finished would be as good as new. Not much new freight-work is done at present, as the force is engaged on repairs the greater portion of the time. During the past season, quite a large number of caboose-cars have been built, and many rebuilt. A noteworthy feature of their construction is the truck. This class of cars have heretofore been built in the style of a street-car, without any separate truck-frame, but the ones to which we refer have a separate truck-frame, very long coupled, and with a bolster at each end on which the body swings. By this improvement the lateral jar is obviated, and the car rides as easy comparatively as a palace-coach. There are only two pairs of wheels to a car.

Mr. M. Wilder is the master car-builder at these shops, and has been connected with the road in this capacity for over nineteen years. He is widely known among railroad men by his experience and ability in the construction of rolling stock. We are indebted to his courtesy for many attentions while visiting his shops.

THE LAKE SHORE AND MICHIGAN SOUTHERN SHOPS, AT BUFFALO.

About four years ago the car-shops of this road were destroyed by fire, but were immediately rebuilt upon the same foundations, with the addition of a new wood-working machine-shop. All the buildings are brick except the blacksmith-shop, which is stone. The erection-shop has a raised roof for light and ventilation, and is large enough for the construction of 24 freight-cars at once, with additional space for office, store-room, cabinet, and pattern-shop. The iron machine and blacksmith-shops are in an end wing, and the wood-working shop is parallel with the wing and connects with the main building in the centre. The machinery is all of the most improved modern style, the fir e hav

ing destroyed all the accumulated antediluvian rubbish or "scrap piles," as the old machines are sometimes called. There are doubtless many car-builders who would be glad if a fire, earthquake, tidal-wave, or some other agent of destruction would make an end of the obsolete machinery they are compelled to use on account of the stinginess of road managers.

The car-work done here may be divided into two classes, the first including all passenger, baggage, mail, and express-cars, and the second all work pertaining to freight-cars. The first-named class is under the supervision of a special foreman, Mr. George Galloway, an old stand-by at these shops. Since the consolidation of the roads no new coaches have been built here, but large numbers are overhauled and rebuilt, and many improvements added to bring them up to modern requirements. During the past season four new caboose-cars have been turned out per month. These differ somewhat from those built at the Cleveland shops, to which we referred in our November number. This difference is in the outside sheathing, the boards being put on up and down instead of lengthwise. This mode, it is claimed, will shed water better. Many car-builders think, however, that sheathing put on horizontally renders a car stiffer; but the fact can not be denied that caboose-cars do less carrying work than any other, and the plan that will best preserve them from the weather, and at the same time give sufficient strength, is the one that should be adopted in their construction.

Mr. R. J. Clancy is the foreman of the freight-car department, the capacity of which is about 30 new cars per month, and 40 old ones repaired per day.

In the blacksmith-shop there are 16 fires; also one of Krehbell's torsion spring power-hammers, which is equal if not superior to any power-hammer we have any knowledge of. It is worked with a cam on the pulley-shaft. The cam strikes an elastic pin, raising the hammer, compressing the spring above, and by the action of the spring a very heavy blow is the result. It is run by a loose belt with a tightener to regulate the speed and force of the blow. The hammer can be used on light or heavy work. In this shop we also noticed an ingenious device for recovering the set in volute springs. After long and severe service, some of these springs become closed up and are usually thrown into the scrap-heap; but here they are heated, put into a machine, and by the aid of a screw in the centre and wedges on the sides, they are restored to their original shape, thus effecting a great saving in this one item. Mr. Samuel Inskip is the foreman of this shop.

The paint-shop is about 600 yards from the car shop, the old Kasson Car-works being used for that purpose. Mr. George O. Widner is the master car-painter. He was formerly in a similar position on the old Bellefontaine Railroad at Galion, Ohio, and is not only a good executive officer, but an artist of decided merit. A great many of the elaborately designed and finished glass bulletin-boards of this road, to be found in hotels and depots, are products of his skill. In the paint-shop were four coaches being painted and finished. Mr. A. C. Robson is the master car-builder in charge of these shops, and to whom we are indebted for many attentions. We must not omit to mention that the plan of promoting men from the ranks to foremen prevails in these shops, and is a successful one. We may say something more on this subject at a future time.

NEW-YORK CENTRAL SHOPS, BUFFALO DIVISION.

The principal shops of this road are at West-Albany. Those at Buffalo, however, are quite extensive, so much so as to put some first-class shops quite in the shade in point of comparison. The work done here is similar to that done at the other shops above referred to. The erection-shop is brick, but without the advantages of a raised roof. It contains 12 tracks running crosswise, each long enough for two freight-cars. The machinery is of a class and quality usually found in well-conducted car-shops. We can not refrain from mentioning the order and system noticeable in the blacksmith-shop, there being a place for every thing, and every thing is found in its place unless it has a legitimate reason for being somewhere else. It is gratifying to be able to walk through a shop of this kind without stumbling over iron and tools lying about loose. The engine is 80 horse-power, and is a splendid specimen of its kind, doing its work with a movement so noiseless as to be scarcely audible. It was made at the works of W. Kidd & Co., Rochester. Two boilers of the locomotive pattern supply the steam for the engine and for heating the shops. A two-story brick building contains the office, supply-room, upholsterer's, tinner's, and painter's departments. No transfer-tables are used by any of the car-shops in Buffalo, the tracks all converging into one at a proper distance from the shop. We can not see any particular advantage in this, but on the contrary more or less disadvantage. A great deal of space is occupied by the numerous tracks which might be otherwise used, to say nothing of rails, ties, switches, targets, etc., which might be dispensed with by the adoption of the transfer-table system. The capacity of these shops is 10 new freight-cars, and 180 of the same class repaired, per week, the latter number including all cars that it is necessary to detain. The regular force employed is 220 men of all grades. Mr. William Johnson, the master car-builder, is a gentleman of large experience in his vocation and well qualified for the position he fills.

BUFFALO, NEW-YORK, AND PHILADELPHIA SHOPS.

This road was formerly known as the Buffalo and Washington Railroad. When completed, it will be 120 miles long, reaching from Buffalo to Emporium, Pa., on the line of the Pennsylvania Central. Ninety-eight miles are already finished and in operation, and a large force is employed in pushing through the residue of the line. The equipment of rolling stock is first class in every respect. They have at present 9 locomotives, 11 passenger-coaches, 3 baggage and mail cars, and 250 freight-cars of all kinds. Nine of the coaches and 2 baggage-cars were built at Worcester, Mass., by Mr. Osgood Bradley, and are of modern style and finish. The coaches bear the names of different stations on the road. The shops are as yet limited, but will be increased correspondingly with the increase of the business of the road. The Buffalo Car Company are now engaged in filling a contract for freight-cars for this road.

Mr. Allen Vail is the master-mechanic, and Mr. Charles Burchard is master car-builder. The latter gentleman was formerly connected with the Lake Shore and Michigan Southern road, and we are indebted to him for the information above given.

How to take Care of Shop Tools.

BY W. E. PARTRIDGE.

In many shops a large number of the tools used by the men are furnished by the shop. This is of course more commonly the case in machine-shops than in any other. As many car-builders have charge of the machine-shop department of the car-work, some notes upon the subject will not be out of place.

Tools, when delivered to individual workmen, are very liable to be lost or to be out of reach when wanted upon the next job. Time is spent in hunting them up; and when found, they may be broken, dull, or otherwise out of order. The greater the number of men the more the trouble is increased. Some kind of system becomes necessary, and the want of it is felt even in the smallest shops. A plan is required which in its practical working will supply the needed tool at the right moment, take it back as soon as the workman is done with it, and if broken or out of order, have it put at once in good condition. Spare tools should also be provided in case of emergency, or to replace such as have become useless beyond repair.

Mr. N. L. Davis, the master-mechanic of the Rutland Railroad, when explaining to the writer his method of keeping tools, remarked that it would pay to have one man in the shop whose business it should be to take charge of all the tools, keep them in repair, and make new ones to replace such as are worn out. He thought that a shop employing only twenty men could profitably employ one man to take charge of the tools. The system adopted by him for his own shop is a very effective one, and is as follows: A practical tool-maker is employed, whose sole business it is to make the tools, take charge of them, and give them out to the men as they are wanted. He has a small room devoted to the manufacture and repairing of tools, and provided with the necessary appliances for the purpose. The steel forging is done under his direction by the steel-forger in the shop, and the tempering, grinding, and finishing is done by the tool-maker, whose room has a window opening directly into the machine-shop. To this window the men come for tools. When one is delivered, a brass tag stamped with the man's name is placed in the box or upon the shelf from which the tool is taken. Should another man come for the same tool, a glance at the box or shelf shows that the tool is gone, and the tag shows who has it. When the tool is returned, the tag which represents it is placed upon a hook with the man's name under it, there being as many tags as there are men in the shop, and these are kept on hooks fixed in a board and hung near the window. The man in charge of the tools would, in some shops, have a great deal of time which could be devoted to other jobs requiring fine work. There are under Mr. Davis about 300 men, all told, and the tool-maker is consequently kept pretty busy. The regular number of tools are not only kept ready for use, but a spare lot besides.

At the extensive shops of the Erie Railway at Susquehanna, where 700 men are employed, and the iron-work for the whole road supplied, a somewhat different system is necessary. The one which was adopted when the works were first started is perhaps the most complete and satisfactory of any, being suited to the requirements of the largest shops. All the tools are manufactured in a general tool-room, which is furnished with lathes, milling-machine, and whatever is specially required by this branch of work. Several men are employed who are regular tool-makers. When a man in the shop wants a tool he applies to the store-room for it, in which three clerks are employed in keeping the books and delivering supplies. The tool is charged to the man who takes it, or, in other words, he buys the tool from the store-room. When he is done with it, or when it is worn out or broken, he returns it and receives credit or another tool, as the case may be.

This system, of course, renders each man responsible for the careful usage and return of tools when no longer wanted. In order to protect the men from loss of tools, Mr. Gregg, the master-mechanic, in designing the shops, provided lockers beneath the benches for each man, in which all tools are kept. No tool-boxes are allowed on benches and around the work, but every thing is kept in the lockers, which are conveniently arranged and locked up at night or when the workmen are absent.

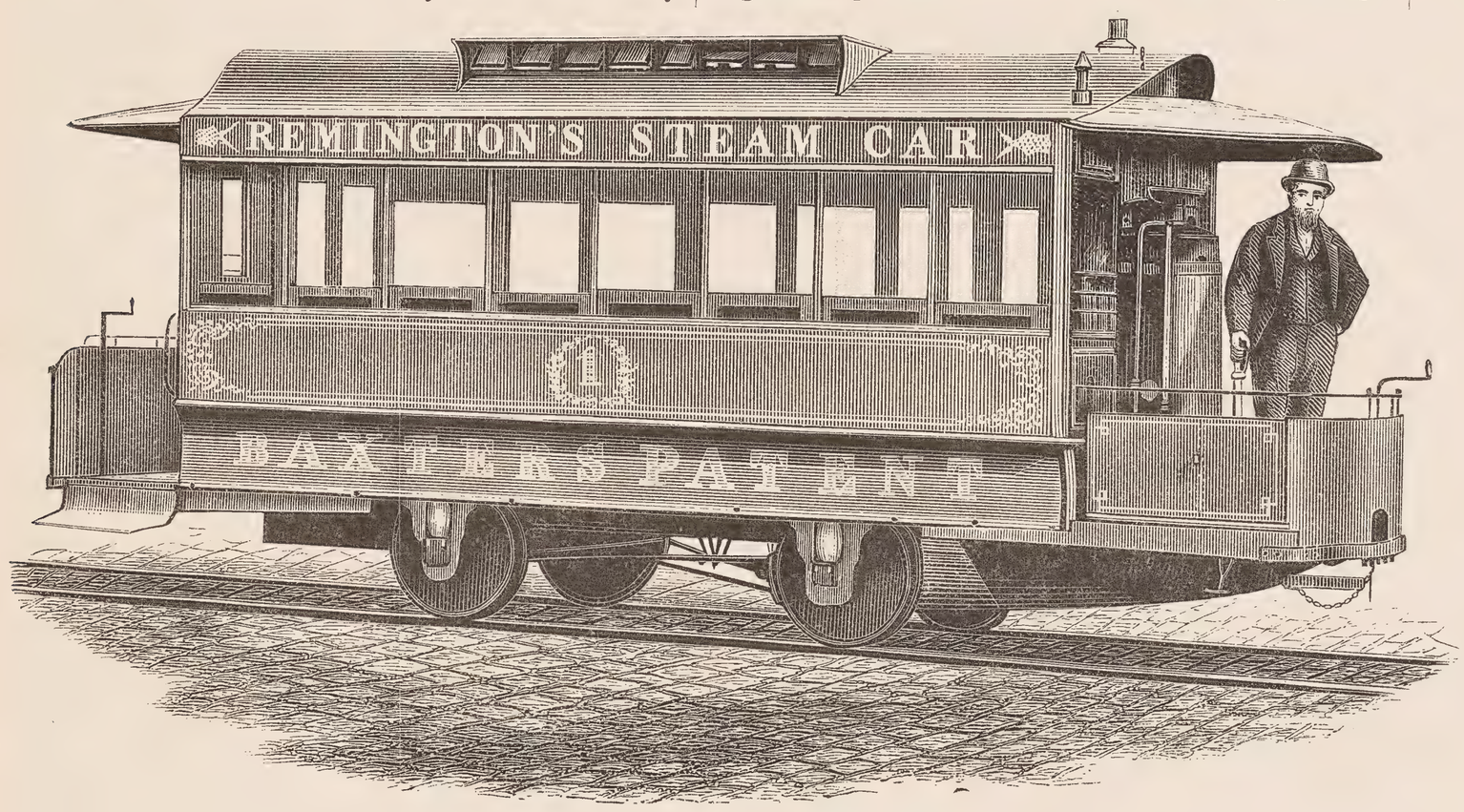
In small shops and in wood-working establishments, where the men frequently own a considerable part of the tools which they use, a modification of such a system will at once suggest itself. There are many kinds of work, such as sharpening and grinding, etc., etc., which one experienced man could do for the whole shop much quicker and better than individual workmen could do for themselves. Men just fitted for this kind of work are to be found in almost every shop, and a great saving of labor would be accomplished by giving one man the charge of all such odd jobs. Such men are usually fine workmen, and other things are constantly coming up of a similar nature which would keep them busy all the time.

MR. HOWARD M. SMITH has been appointed master-mechanic of the Nashville Division of the St. Louis and South-eastern Railroad, vice W. H. Russell, resigned. The car-shops of this division are at Earlington, Ky. The office of Mr. Smith is at Nashville.

The Baxter Steam Street-Car.

In our last issue we alluded to a new steam-car designed for street-railroads, trials of which had been made on one of our city lines having the sharpest curves and heaviest grades, with the most satisfactory results. The engravings we now present will enable the reader to form a very correct idea of the completed car as it stands upon the track ready for service, as well as the running-gear and engine, as they appear when detached from the car-body.

It will be seen that in its general appearance the vehicle does not differ materially from the ordinary



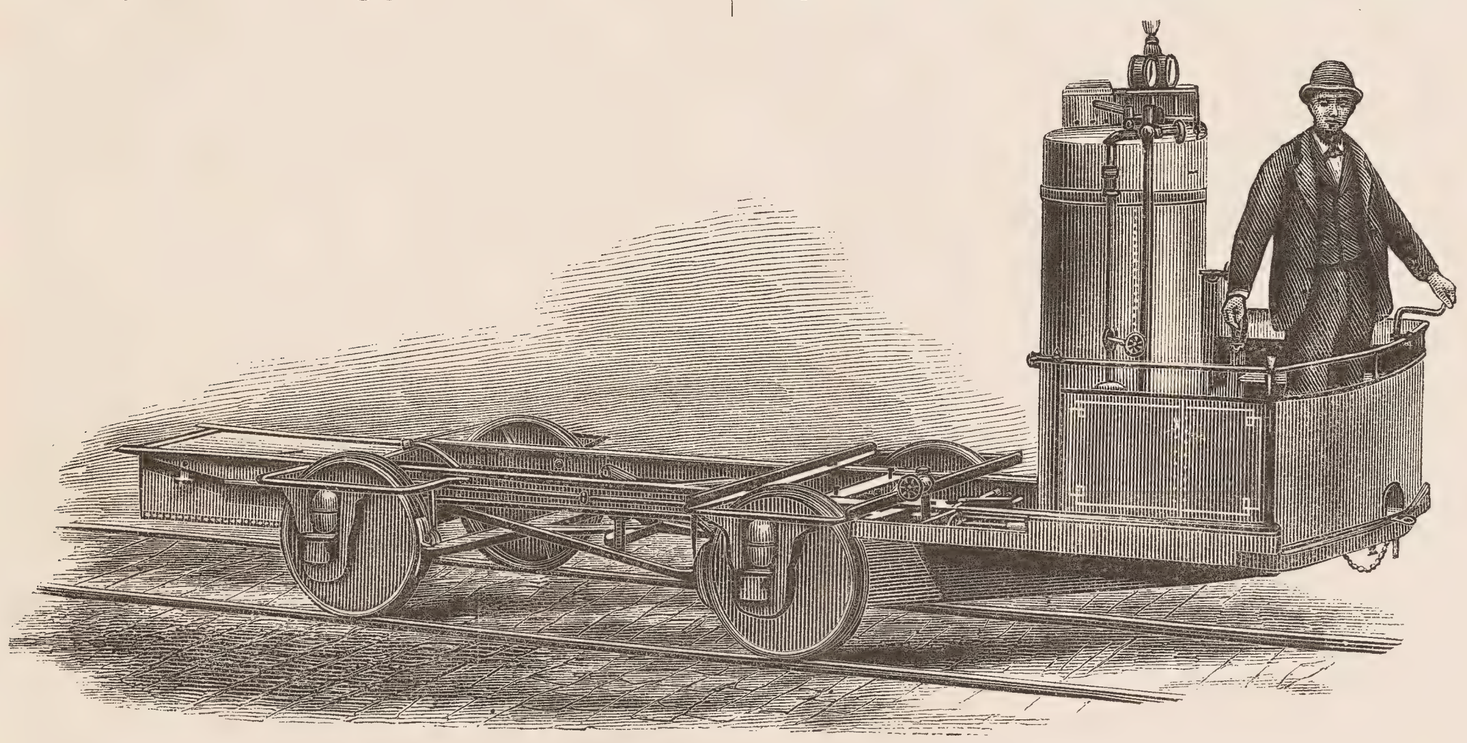
CAR AND ENGINE COMPLETE.

street-car, the dimensions being about the same, and the space occupied by the boiler being so limited as not to encroach upon the seating capacity for passengers. The boiler is upright, and is placed on the front platform, occupying the room usually given to the front door. In its essential features it resembles the well-known Baxter Portable Engine, and is constructed upon the most approved principles, and of the best materials. It is jacketed, felted, and covered with the finest sheet-iron, and is separated from the interior of the car by a non-conducting partition, so that in summer its heat is not felt by the passengers, while in winter the car can be comfortably warmed by using the exhaust steam in pipes underneath the seats.

The engine is of the double-cylinder type, working expansively. In its details it follows almost precisely the most approved locomotive construction, the two cylinders, respectively 5 and 8 inches in diameter, with a 12-inch piston-stroke, acting directly upon the forward axle, which is cranked. The cylinders, links, connections, etc., are disposed immediately beneath the front platform, and carefully protected by a closed apron against dust or street filth. The water-tank in the car illustrated is placed under the rear platform, but can be located in other parts of the car if necessary.

To render steam-propulsion available for use in cities, the intermittent blast from the cylinders and the smoke from the chimney must be done away with. Both of these difficulties have been overcome. The system of combustion is so thorough that its product, after the car is once in motion, is rarely perceptible even in the shape of a thin gaseous exhalation. An ingenious provision, not shown in the engravings, likewise makes the exhaust practically noiseless, so that the operation of the machinery is unnoticed.

In addition to these advantages, so important in crowded thoroughfares, this invention has a peculiar feature which makes it available for heavy grades, the ascent of which has baffled all previous attempts of a similar kind. In the ordinary double-cylinder engine the steam from the small cylinder exhausts directly into the larger one, which consequently works at a comparatively low pressure. In the present instance the process is similar in running over a route with no serious gradients, the nominal power of the engine (five-horse) being ample for the largest load upon a level track. When a severe gradient is encountered, however, both cylinders are fed by means of a novel arrangement, with high-pressure steam, increasing the working capacity of the engine for the time being some five or six times. In recent trials over the Bleecker street railroad, in this city, the first car constructed has, with a load of sixty passengers, found no difficulty in surmounting ascents of one foot in fourteen.



TRUCK AND ENGINE WITHOUT CAR-BODY.

The economy of operating this new method of propulsion is one of its marked advantages. The trials that have thus far been made show that the quantity of coal consumed, of the anthracite stove size, does not exceed five pounds per mile. The engine is the invention of Mr. William Baxter, whose portable engines, manufactured by Colt's Arms Manufacturing Company, are so well known. The weight of the car and engine is about 8000 pounds, an ordinary car weighing about 4500 pounds. The car was constructed by Messrs. E. Remington & Sons, the celebrated gun manufacturers, at Ilion, N. Y., where they have works organized on a large scale for the building of steam street-cars. Once fairly introduced, we venture to predict that this new method of transit, with such modifications as experience may suggest, will gradually but surely overcome existing prejudices, until the use of horse-power will be entirely superseded, especially on the lines of heavy traffic in large cities. All that is required is to meet and overcome the mechanical difficulties of the case. If the car can be made to run noiselessly, start and stop promptly, keep the track, and in all respects be under as complete control as the ordinary horse-car, we do not see but all the conditions are met and provided for. The sharp curves and heavy grades of the Bleecker-street line are quite exceptional, and if these particular obstacles have already been overcome, there can be no difficulty on the many long lines where no such grades and curves exist.

An Improved Coupler.

A mechanic in Louisville has invented a coupler which is said to possess decided merit. It is made of wrought-iron, and weighs about ninety-five pounds, with fixtures and all complete. It consists of a bar or tongue, about eighteen inches long, which slides into a socket with infallible accuracy. To uncouple a train, it is only necessary to pull a wire worked from the platform or top of the cars; or, if cords are placed upon the wire, the engineer can manage the coupling with but little trouble. With this invention all lost motion is taken up. This link, or tongue, will wear equal to a half-dozen of the old style. The engineer is enabled to couple any number of cars without any assistance whatever, thus saving all accidents, as it is not necessary to go between the cars to make the coupling, the whole apparatus being worked by the engineer, or from the platform by a brakeman. It is no more complicated than the common bumper, it couples itself, and can also be coupled with a link similar to the old couplers, and it is impossible for the couplers to get out of order without breaking the whole car. It does away with "winging" from the side, which frequently causes cars to jump the track. It is simply impossible for the human hand to accomplish the same work with like precision, and this coupler can be changed instantly from the self-coupler to the common coupler. Should danger present itself, any passenger can uncouple it.

Watering Animals on Cars.

The trouble and loss of time watering cattle *en route* to market—besides, probably, much suffering to the animals—is said to be saved by an ingenious device recently patented in England, whereby they can drink while in the cars—probably the best "watering of stock" yet devised. This apparatus is located at stations, so that cattle and horses may drink while the tender is taking water. A large galvanized iron trough is slung on a pivoted frame, arranged close to the track opposite where each cattle-car is stopped. When the device is not in use, the frame is turned vertically to bring the trough up and away from the car; but when needed, the trough, filled with water from a pipe or pump, is let down close to an opening made longitudinally in the side of the car, and through which the cattle thrust their heads to drink.

Correspondence.

The Erie Car-Works, Erie, Pa.

CLEVELAND, OHIO, Dec., 1872.

EDITOR OF THE NATIONAL CAR-BUILDER:

DEAR SIR: Having recently made a flying visit to sundry points along the easterly shore of our lake, I venture to send you some account of the Erie Car-works, located at the thriving city of Erie, Pa., and one of the largest establishments of the kind in the country. The works have been in operation about seven years, and have increased within that time from a small two-cars-a-day concern to their present capacity of ten freight-cars a day. The causes of this prosperous growth are to be found in the energy, executive ability, and skillful management of the parties in immediate charge. The company commenced business with the determination not to be excelled by any one else in the quality of the special class of work they have undertaken; and the large numbers of cars made at these works, to be found on the principal roads of the country, show whether or not they have been successful.

Mr. W. R. Davenport is President of the Company and superintendent of the works, and every department is under his personal supervision, even to the minor details of construction, which are carried out to the letter in accordance with his directions. The capacity of combining general supervision with a sure grasp and command of details, is one of the secrets of success in conducting a business of this kind, and this capacity is possessed by Mr. Davenport in a remarkable degree. Among other things which might be mentioned as contributing to the superior quality of the work done here, I will specially note that charcoal iron is used in every case where it can be used; and that the work is not sub-contracted. Each department has a salaried foreman, who is not paid so much for the quantity of the work turned out as for the quality of it. The employees of all grades understand that it is for their advantage to do good work, and there is also mutual good feeling existing between officers, foremen, and men. In many manufacturing and railway-shops the lines of separation between these classes are so rigidly drawn that constant ill-feeling and dissatisfaction exist, to the detriment of all concerned and also of the business.

The shops are located in the western part of the city, upon an area of seven acres, and have connection with all the railroads running to and from the place. The principal building is 300 x 50, and is occupied by the iron and wood-working machinery, embracing the latest and most improved patterns. Among these is a 6-spindle drill for arch-bars and bunter-jaws, 200 of which can be drilled in ten hours by one man; also two double-head bolt-cutting, and two double-head nut-tapping machines, their capacity being 6000 bolts or nuts per day. There are also two upright wood-boring machines specially adapted to car-work, each having four heads, thereby obviating the necessity of a frequent change of auger-bits. The runner generally knows what class of work he is to do during the day, and sets his bits accordingly. The table that holds the timber works on the principle of a mortising-machine table, laterally. This machine is original with the shop.

There are two erecting-shops standing parallel to each other, each 40 x 142, containing two tracks, with ample room for eight freight-cars in each. At the end of these shops, opposite the machinery building, and in a line with them, are the paint-shops. Adjoining the iron-machine room is the blacksmith-shop. There are also various other necessary structures for storing oil and paints, iron, and worked material. Some 12 acres are occupied as a lumber-yard, which is kept well replenished with all the requisite kinds of timber.

Another thing worthy of notice is a three-story building, 40 x 150, which is now being erected by the company and nearly finished. It is designed for a boarding-house for the men, or such of them as can conveniently avail themselves of it, the intention being to give them better accommodations on the premises where they are employed, and for less money, than they can obtain elsewhere. This will be a great advantage to the men, who now live two or three miles off, and it will also be an advantage to the company to have them near at hand in case of fire. A reading-room will be provided and kept supplied with newspapers and magazines, also facilities for writing, and whatever will contribute to comfort and render the house attractive. It will be conducted upon strictly temperance principles, the company being such a terror to grogshops that there isn't one anywhere near the works. The superintendent's theory is that the better men are treated, the better the service rendered, and the greater the advantage to the business in the end. This of course applies to the class of men who are not naturally prone to vice and dissipation.

The company do all the repairing for the Empire Freight Line, and have shops for this purpose in the eastern part of the city. Adjoining the above-described premises are the well-known

CAR-WHEEL AND FOUNDRY WORKS OF DAVENPORT, FAIRBAIRN & CO.

This firm are large shareholders in the car-works, and do all the foundry-work for them. The present capacity is 100 car-wheels per day, exclusive of other castings for the car-works and for outside customers. There is now in the course of construction, and nearly completed, a new foundry building, 109 x 252, which, in connection with the old building, will increase the capacity to 350 car-wheels per day. This will make the establishment one of the largest of the kind in the country. The superintendent, Mr. John Fairbairn, is an experienced moulder, well acquainted with the nature and qualities of iron, as his work will attest. All the castings made here are of charcoal-iron, and nothing inferior in the way of material is permitted to be used. Every wheel is inspected in the casting by the superintendent, and if it does not prove perfect in every respect it is sent to the scrap-heap.

The Wilmington process of chilling wheels is used, with an improvement thereto by Mr. Fairbairn. The original process seeks to secure an evenness of chill on the tread and neck of the wheel, but in doing this the flange is chilled too much, and has a tendency to crack and snap off. After sundry experiments with a view to overcome the difficulty, Mr. Fairbairn at length succeeded in doing so. In preparing the core he does not make the flange so wide, but brings the line between the core and sand closer to the neck. In doing this he claims that the chill is perfect, and the same depth is more frequently obtained in tread, neck, and flange, than by any other process known. This is demonstrated by the wheels made, and the test of them by actual service. In the scrap-heap of these works are a great number of wheels by different makers, taken from Empire Line Cars as they are repaired. Six pieces of the rims of as many different brands of wheels were taken from the pile, and the same defect was found in all of them; in some the chill was too deep in the tread and flange in order to secure sufficient depth in the neck; in others, the proper depth was found in the tread, but scarcely any in the neck. These faults condemned them. I know of a road that has 200 coal-cars from the Erie Car-Works, with Davenport & Fairbairn wheels, and after two years' constant service, but one wheel has proved imperfect, and that burst from being pressed too tight on the axle. The rest of them have no appearance of wearing out.

I must not omit to mention a remarkable feature of these wheel and car-works, consisting of a natural gas-well 705 feet deep, from which a constant supply of gas is obtained for lighting and heating the shops, and it is also used as fuel for the boilers and for other purposes where heat is required. It is carried in pipes all over the premises, the supply greatly exceeding the consumption. About twice a week the well is pumped to get out the salt-water which accumulates in it. What a mine of wealth such a well would be to a New-York gas company at the present rates charged for it in your city! Another well is being completed near the new foundry, and is intended for its use.

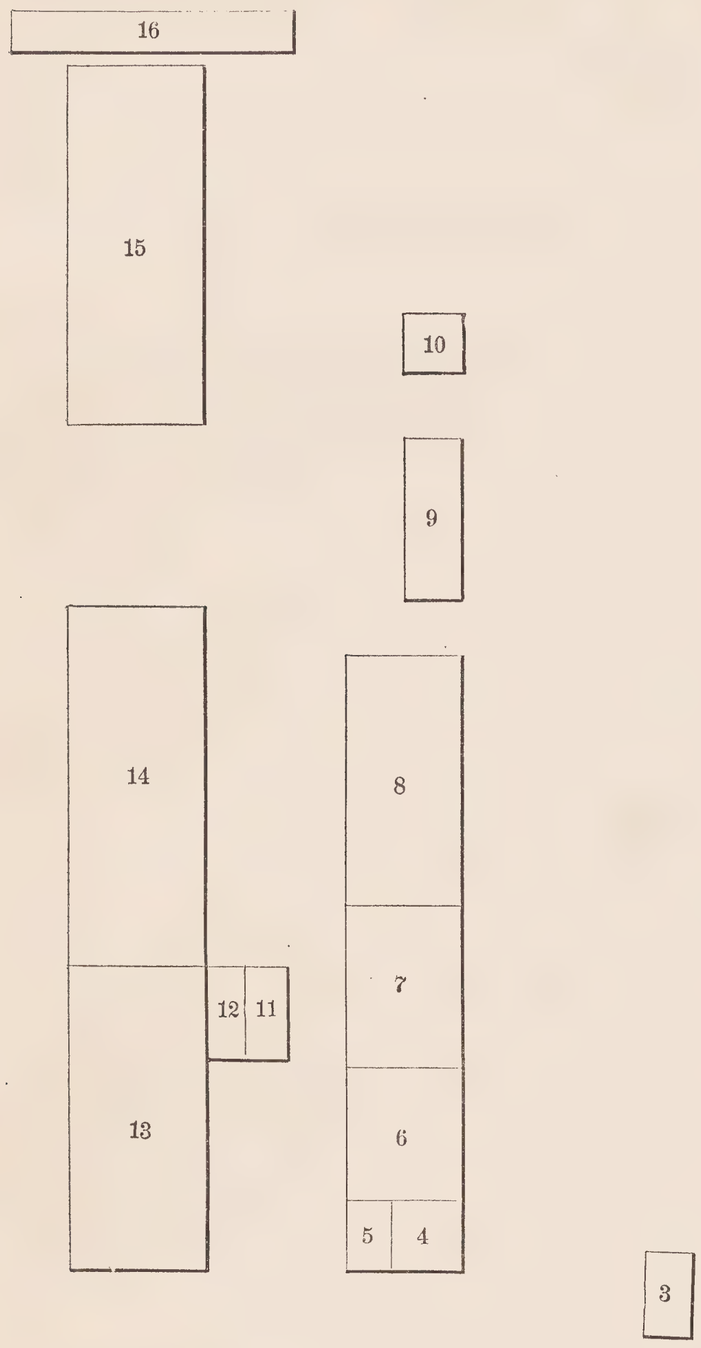
MACK.

The Wharton Safety-Switch.

IN our last issue we copied a paragraph from the *American Manufacturer*, regretting the absence in railroad operation of an automatic switch that would tend itself, and practically answer the purposes required of it. It is alleged that the Wharton switch, although not strictly automatic in its working, is a very great improvement on the ordinary kind, as has already been tested in its practical use. The paper above named, in a subsequent article on the subject, says of the Wharton switch, that there seems to be no question of its great practical importance, inasmuch as it keeps the main line of the railroad-track unbroken and undisturbed, and can hardly be displaced either by negligence or wickedness. The switch-rails, with the movable guard, are so arranged that when the switch is not in use, they do not in any way act upon or touch against the car-wheels moving on the main track; while, when it is desired to transfer cars from the main track to the siding, they are so moved that the transfer is accomplished in an easy and gentle manner, the switch apparatus being released immediately thereafter, resulting in the switch-rails being again moved from the main track, leaving it entirely clear for all succeeding wheels. This is for double track; for single-track railroads, where it is necessary to provide for the safety of trains moving in both directions, by means of a very simple apparatus, the presence of a man is needed to keep the rail in position to act as a switch; so that he can not leave without the switch-rails also moving away and leaving the main track clear. It is claimed that even if the switch is tampered with, or left wrong, in seventy-five cases out of a hundred no accident can occur, while in the remaining cases they can only happen when the train runs against, instead of with, the switch. These switches are made of solid Bessemer steel, and no castings are required, while the saving of each switch, over that of the ordinary railroad-switch, for every five years, is estimated at $141.50, aside from the additional saving effected on the rolling-stock by avoiding the excessive wear and tear at the open joints of the ordinary switch. It has already been adopted by the Pennsylvania Central and many other important lines of road, and gives almost perfect protection to travel on the main track, besides having numerous advantages on the score of economy. Col. Thomas A. Scott, of the Pennsylvania Central Railroad, states that careful experiment has demonstrated it to be thoroughly adapted to all the wants of the road, and that the company propose to adopt it on all lines owned or leased by that corporation as fast as can be done. The invention is secured by letters-patent, and will doubtless prove of great practical value to all the railroads of the country.

To give some idea of the material used on the Pacific Railroad, it is stated that there were about 300,000 tons of iron rails, 1,700,000 fish-plates, 6,800,000 bolts, 6,126,375 cross-ties, 35,505,500 spikes, and an incalculable amount of sawed lumber, boards for buildings, timber for trestles, etc. Estimating the cost of the road with equipments complete by that of other first-class roads, ($105,000 per mile,) we have the sum of $186,498,900 as the approximate cost or value of the work—though it is conceded that the two roads were constructed for less, and that a large margin was secured by the pioneers who began and finished them. To operate the road there are now in use 333 locomotives, 156 passenger-cars, 43 palace sleeping-cars, 76 emigrant and second-class cars; dump and section-cars, 430; stock, coal, and iron-cars, 725; fruit-cars, 32; and other cars, including those of the officers, in all, 7769.

The Buffalo Car-Works.



1 Office, } 24 x 30.
2 Scales, }
3 Stables, 20 x 50.
4 Store-Room,
5 Storekeeper's and Draughtsman's Office, } 60 x 36.
6 Pattern-Shop, 60 x 70.
7 Iron Machine-Shop, 80 x 60.
8 Blacksmith's Shop, 60 x 125.
9 Iron Storehouse, 25 x 67.
10 Paint and Oil Room, 18 x 24.
11 Engine-Room, } 45 x 45.
12 Boiler-Room, }
13 Wood Machine-Shop, 73 x 160.
14 Erection-Shop, 73 x 180.
15 Paint-Shop, 73 x 180.
16 Transfer-Table Pit, 30 x 150.

THE Buffalo Car Company was organized in 1871, and a tract of land containing forty-five acres was purchased in East-Buffalo, near the intersection of the Buffalo, New-York, and Philadelphia, and Erie Railways, for the location of their works. The necessary buildings were completed during the past summer, and active operations commenced early in the fall. The several structures are well built and substantial, and although they differ somewhat in their general arrangement from other works of the kind, they are nevertheless well adapted to the purpose for which they are designed Economy of time and labor, so important in the operation and management of all manufacturing establishments, has been duly provided for in the details and general arrangement. There is no unnecessary handling of material. When it leaves the lumber-yard, it moves along from hand to hand, and from one shop to another, until it receives the finishing coat of paint or varnish in the shape of a completed car ready for the track. The diagram will enable the reader to form an idea of the relative position and size of the several shops, as compared with others which we have heretofore illustrated and described.

The present buildings are adapted more especially to the construction of freight-cars, and the company have thus far been fully occupied in filling orders for this class of work. Additional buildings will in due time be erected with the necessary facilities for turning out passenger-cars. A large stock of lumber was laid in some time ago, which is now well seasoned and ready for use. The stock will be kept replenished, so that a constant supply of seasoned timber will be at all times available.

We will notice the several departments in the order in which they are numbered in the diagram. On the right, at a considerable distance from the main buildings, are the office and stables. In connection with the former, and under the same roof, are large scales. No. 4 of the main buildings is a store-room, containing an ample supply of small material and fixtures indispensable in such an establishment, arranged and classified so that any article can be obtained at a moment's notice and without any useless expenditure of red tape. In connection with this room, and separated from it by a partition, is the store-keeper's and draughtsman's office. Next comes the pattern-shop, which is supplied with a light surfacer, a wood-turning lathe, light mortise-machine, a scroll-saw, and two circular saws. These machines have been selected with regard to their special fitness for the work in this department. The iron machine-shop, next adjoining, contains all the various machines usually found in a shop of this kind, distributed in such a way as to be operated to the best advantage. The blacksmith-shop is provided with all the necessary facilities, and is also well ventilated. In too many shops of this class there is more or less annoyance from smoke; but in this one the trouble has been obviated by providing for a draught which keeps it free from smoke, and at the same time secures abundant ventilation. The iron store-house comes next, and contains a stock of this material, including every quality, shape, and size likely to be wanted. The paint and oil-house is a small structure somewhat apart from the main buildings, underneath which is a vault in which these combustible materials are stored, and where they can be kept in a better state of preservation than above ground.

The engine which drives all the machinery is rated at 80 horse-power, and was built by the Cummings Works, Buffalo. The boiler is 5½ x 11 feet, and has, in proportion to its size, an unusual quantity of heating surface. The fire-room is adjacent to the wood-working shop, and the chips and shavings are conveyed to it with little trouble.

In the way of wood-working machinery no expense has been spared in securing the latest and most improved patterns, and in sufficient quantity to guarantee a regular and systematic running of the shop without taxing one portion more than another. We noticed tenon-machines, Daniels planers, mortise-machines, railway cross-cut saws, scroll and jig-saws, and large gaining and boring-machines, all of which had been selected with great care from such establishments as J. A. Fay & Co., C. B. Rogers & Co., Atlantic Works, Power, Tainter & Co., and others. Each piece of machinery is set on a foundation of cut stone, three feet thick, which gives it steadiness and prevents jarring and shaking.

The erection-shop has three tracks running lengthwise the building, and continuing through the paint-shop, where they converge into one—the shipping track. The central track of the three runs through the wood-machine room and out into the lumber-yard, where, by means of numerous small turn-tables, every part of the yard is accessible. There is also every facility for receiving material and shipping cars, the works being connected with the Erie Railway on the north, and Buffalo, New-York, and Philadelphia road on the south side of the premises.

Every precaution has been taken against fire, in the way of extinguishers, fire-plugs, hose, buckets, etc., ready for use in an emergency and at the shortest notice. The buildings are all of brick, one story high, and have slate roofs. The popular "Mansard" ornament has been severely ignored.

The officers of the company are, William Williams, President; Jonathan Scoville, Vice-President; G. S. Williams, Secretary and Treasurer, and J. N. Mileham, Superintendent. The last-named gentleman was formerly master car-builder of the Lake Shore and Michigan Southern shops, at Buffalo. His capacity and long experience in this department admirably qualify him for his present position, and are a sufficient guarantee that the best of work will be turned out by the shops under his supervision.

Light Freight-Car.

MR. C. A. SMITH, the master car-builder of the Erie Railway, (6-feet gauge,) has just completed a light box freight-car, in which he has attempted to reduce the weight to the lowest limit without lessening the strength where strength is required. For example, the axles weigh 400 lbs. each, and the wheels, which are 33 inches in diameter, weigh 530 each. The body of the car is 29 ft. 2 in. long by 8 ft. 8 in. wide outside, The whole weight of the car is, notwithstanding the heavy wheels and axles, only 17,700 lbs. The inside dimensions are 28 ft. 8 in. long by 8 ft. 1 in. wide and 6 ft. high, measuring from the top of floor to the under side of the rafters at the eaves. It therefore has 1,390 cubic feet of space, and, calculating 15 pounds of freight to each cubic foot, would carry 20,850 lbs. of freight. If it is loaded with 26 pounds of freight per cubic foot, which is the quantity said to be carried on the Denver and Rio Grande (3-feet gauge) road, the new Erie car would carry 36,140 pounds of freight, or *more* than double its own weight, whereas the cars of the narrow gauge are said to weigh 8800 pounds, and to carry 17,600, or just double their own weight. To do this, the latter must be loaded with 26 pounds of freight per cubic foot of space. It will be seen, therefore, that the gauge has very little to do with the capacity of cars, and that for a 6-feet gauge they can be made to carry quite as much in proportion to their weight as for a 3-feet gauge. As almost the whole argument in favor of the narrow gauge is based upon the *assumed* reduction of the dead-weight of the cars for such roads, the facts presented have much importance in that connection, as well as in their relation to the equipment used on roads of the standard 4 feet 8½ inches and wider gauges.

It has frequently been suggested by us that if a careful and intelligent effort were made to reduce the weight of cars, a very great reduction would be possible without lessening their strength. Mr. Smith is the first car-builder that has done this, and his car is well worth the attention of railroad managers, as it is designed and built with great skill, and is, we believe, quite as capable of performing the duty required of cars in the service of the company with which he is connected as any others on the line.—*Railroad Gazette.*

Flaws in Railway Axles.

IN order to more effectually prevent flaws in railway axles, a method of shaping them by rolling pressure, instead of by hammering, has been devised by an English engineer, the result being accomplished in two minutes instead of half an hour, as required by the ordinary plan—the axle at the same time being not only superior in quality but more uniform in size, and of course capable of being produced more cheaply. The machine used for accomplishing this purpose consists of three rollers, regulated so as gradually to press more closely together, thus reducing the diameter of the bar, and extending its length until shaped to the size required. Axles of any length can be rolled in this manner with collars at any part; and the rollers are geared to revolve all in the same direction, their friction imparting motion to the axle. It is claimed that one of the benefits of this rolling process is to obviate those flaws in axles which so frequently cause disasters on railways.

THERE is an Irishman employed as a porter on a rail-car who brags of having a watch that keeps correct time. He was heard to remark not many mornings since, upon pulling out his watch, "If the sun an't over that hill in a minnit and a half, he will be late."

The National Car-Builder,

PUBLISHED MONTHLY,

BY

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JAMES GILLET, EDITOR.

Terms, One Dollar per Annum.

JANUARY, 1873.

Editorial Announcements.

Correspondence.—*We cordially invite the coöperation of the railroad public in affording us the material for a good mechanical paper. Articles relating to rolling-stock and machinery, by those practically acquainted with those subjects, will be gratefully received. All communications must be addressed to Vose, Dinsmore & Co., No.* 1 *Barclay Street.*

The name and address of the writer must accompany all communications designed for publication.

Advertising Rates.—*For one square, or one fifth of a column,* $5 *per month, or* $50 *a year. For half a square,* $3 *per month, or* $25 *a year. Larger advertisements by special contract.*

All communications in regard to advertising should be addressed to L. F. Dinsmore, *Post-Office Box* 4055, *New-York City, who is our agent for advertising, and authorized to make contracts, collections, etc.*

Engravings and Illustrations.

We would invite the attention of Master Car-Builders and others to the advantages to be derived from publishing in The National Car-Builder *engravings designed to illustrate the various features and details of car construction, and especially such improvements as can not otherwise be clearly presented. We will procure cuts to be made in the best manner from drawings or models that may be sent us, and charge only for the cost of engraving, inserting the same in our paper with suitable descriptive details, without charge.*

Ourselves.

It is now two years and a half since the first number of The Car-Builder was issued. The present number, which begins the fourth volume, contains twenty-four inside pages, being three times its original size. It has been enlarged from time to time to accommodate advertisers, whose steadily-increasing favors, in connection with a growing subscription list, we feel justified in regarding as so many testimonials of appreciation and encouragement. For this we desire to express our gratitude, with the assurance of our best efforts in the future to merit a continuance of the patronage so liberally bestowed.

The price of subscription has been increased to one dollar per year, which we are sure our readers will not consider exorbitant, even with the addition of the trifling item of postage. As regards the quality of the reading matter, original and selected, which has formed the staple of previous numbers, it does not become us, perhaps, to speak. With a larger expenditure of time, money, and labor, it might have been better, as we intend it shall be in the future. We have thus far supplied our readers with a monthly journal attractive in form, and elegantly printed, at a price little more than nominal; but with increased facilities for procuring acceptable contributions, correspondence, illustrations, and items of current news, we shall be able to make each future issue more desirable than ever as a medium of information and intelligence adapted to the wants of car-builders, and a welcome visitor to railway-shops and offices. The past has been a success; and in order that the future may be even more so, we invite the aid and coöperation of all who are identified with the mechanical departments of railways, by giving us such facts, views, and suggestions relative to car construction and matters incidental thereto, as may be suited to our columns.

We would also, in this connection, request those who are now receiving The Car-Builder, and who are in arrears for subscription, to make us an early remittance. Our friends in each of the many car and railway shops all over the land will also afford us substantial aid by calling attention to our publication, and sending us the names of such new subscribers as they may be able to procure. The price is very low, and we feel assured that every one who sends us a dollar will feel, at the end of the year, that he has received an equivalent for his money. The mere subscription price of a periodical like The Car-Builder is comparatively but a small item toward defraying the expense of its publication; but the contribution of each individual subscriber helps none the less to reduce the general aggregate of expenditure. Every dollar remitted is just as acceptable as if the amount were larger, the principle involved being an exchange of values for mutual advantage.

The present volume will have continuous pages, and an index will be furnished at the end of the year. We shall also print a sufficient number of extra copies each month to be able to supply a limited number of bound volumes for 1873 to whoever may desire them.

Master Car-Builders' Rooms.

We mentioned in our last issue that rooms were then being fitted up at 111 Liberty street, in this city, designed to be used as headquarters for the members of the Master Car-Builders' Association, and also as a place of resort for railroad-men generally. Through the exertions of Mr. C. A. Smith, of the Erie Railway, and Mr. Leander Garey, of the New-York and Harlem Railroad, the fitting up was completed early last month, and a few days afterward the rooms were formally opened. About thirty members of the association, with their friends, were present on the occasion. Mr. M. C. Andrews was called to the chair, when Mr. Garey made a statement explaining the objects which had led to the fitting up and opening of the rooms. Other remarks were made by those present, and congratulations exchanged, when the company partook of a bountiful lunch which had been prepared, consisting of substantials and liquids in suitable proportions.

A committee was then appointed to prepare resolutions, whereupon the following was reported and unanimously agreed to:

Whereas, The Master Car-Builders' Association have been in special convention assembled in the rooms provided in the city of New-York for the permanent occupation and casual meeting of its members; and

Whereas, The fittings and appointments of the same and the purposes for which they are provided meet our unqualified approval; therefore

Resolved, That the thanks of this association be, and the same are hereby, tendered to Messrs. Garey and Smith for their ability, taste, and discretion in the selection and appointments of these headquarters.

A committee was also appointed, consisting of Messrs. Garey, Smith, and Forney, for the purpose of examining models, drawings, etc., presented by applicants to be placed in the rooms, and to decide upon the admissibility of the same.

A resolution was also adopted, fixing upon the third Thursday evening of each month as the time for holding regular meetings at the rooms for social and business purposes. The members of the association are specially requested to be present at these monthly meetings, and also to make use of the rooms while staying in the city. They are fitted up in a comfortable manner, and supplied with conveniences for writing and the transaction of business. The records of the association will be deposited here, and in due time there will be an accumulation of valuable drawings and models, and whatever else may be deemed worthy of preservation, for the benefit of the association.

The leading purpose is to bring together at all times the members that may be visiting the city, by having an attractive and suitable place known and recognized as headquarters, and thereby to facilitate social and business intercourse and promote the usefulness of the organization. We trust that every member will duly appreciate the importance of the matter, and make it a point to attend the stated monthly meetings when practicable.

Make your Workmen Comfortable.

The comfort of workmen in a large manufacturing establishment has an important bearing upon the quantity and quality of the work done. Let any one take a look at a dark, cold, or awkwardly-planned machine-shop, poorly lighted, imperfectly ventilated, or indifferently heated, and compare it with another shop having none of these disagreeable features, and the contrast will convince him of the effect of these opposite conditions upon the workmen and their work.

The Erie Railway shops at Susquehanna, N. Y., designed by Mr. James B. Gregg, the master-mechanic, and built under his superintendence, may be taken as an example of what should be done in the matter of providing for the comfort of employees in extensive work-shops. As regards heating, the practice of this establishment shows that coils of steam-pipe beneath the benches keep all the rooms at a comfortable temperature for working during the winter, so that there will be no undue exposure in passing from one room to another. The rooms are also provided with plenty of light, even in the shortest and gloomiest days, and a further improvement in this respect might be made by white-washing the beams overhead and other wood-work. When daylight fails, an abundance of gas is provided, so that the work can go on until the time of closing at six o'clock or later.

Water-closets connected with extensive shops should receive far more attention in their construction and management than is usually given to them. At the Susquehanna shops these closets are all in one large, well-lighted room, which is kept at the same temperature as the other rooms. Washing facilities are also provided, so that the apartment is a washing room as well as closet, a fact which will convey an idea of the perfect cleanliness which is maintained. Underneath the stone floor is a capacious tank which receives all filth and slops. This tank is filled with fresh water every morning, and at night is emptied by opening a gate. It is then washed out, filled and emptied again, and before the final filling for the next day, it is cleaned in every corner by a stream of water from a hose pipe under a strong pressure. The hose is also used for cleansing every seat and basin as well as the floor. The benefit derived from this kind of attention to matters pertaining to the cleanliness and comfort of workmen can hardly be overestimated. Health is preserved, tempers are sweetened, discontent is allayed, work becomes pleasant recreation instead of toil, and all at a merely nominal cost to the proprietors, which is repaid twice over in the long run in the saving of time and innumerable other ways which need not be specified.

Our Directory.

We desire to make our directory of master-mechanics and master car-builders as complete and reliable as possible, although in the nature of the case, and in spite of our best endeavors, it must contain many errors of omission and otherwise. Changes are constantly occurring, of which we have no means of obtaining early information except from the parties themselves, or from others who may have personal knowledge of the same. We therefore repeat the request we have heretofore made, that our readers will give us prompt advice of any errors they may notice in our list of roads or persons, so we can make the necessary corrections. The names sent us should be written legibly and in full, and the proper distinction

made whenever the initials J and I are used, so we may not mistake one for the other. The proper address of each name should also be given.

This directory is a very useful and convenient one in railway and business circles generally, and especially for correspondence and reference. Its value depends entirely upon its correctness, and although it must necessarily be more or less imperfect, we can, with the aid of our many readers, reduce its imperfections to a minimum.

THE fifth annual report of the Railway Master-Mechanics' Association has been published, and is ready for distribution. We have not yet received a copy, but judging from the unofficial report published last summer, the proceedings contain a large amount of useful and practical information respecting railroad management. The discussions are very full, and interesting even to the general reader, embodying, as they do, the best experience of the ablest mechanics.

WE have in preparation some notes of a recent visit to the car-shops at Wilmington and Baltimore, which will appear in our next number.

THE vacuum-brake recently patented was tried on an adjoining track with the Westinghouse on the Philadelphia and Reading Railroad lately. The Reading *Eagle* gives the following as the result of the test: "The brakes were applied to two trains of equal length, and the trial was made on the straight line of four miles between this city and Leesport. The trains were run in the same direction side by side, at a speed of thirty-five miles an hour, and the brakes were applied at a given signal. Two trials were made, at the first of which the train to which the vacuum-brake was attached ran a distance of seventy feet less than the other train, and at the second a distance of one hundred feet."

BESSEMER, the great steel manufacturer, is about to make a cannon twenty yards long. The diameter will be forty-eight inches, and the bore thirty inches. It is expected to discharge a shell weighing five tons. In order to give sufficient impetus to this monster projectile, the load of powder will be placed in five different chambers. The explosion of the first will start the shell, and as it flashes along the barrel the other four will be fired successively, each of them giving it fresh force. If the plan proves feasible, the defenses of the world, on land and on sea, will be useless. A five-ton shell would dismantle any fort, except perhaps Gibraltar, and would sink any iron-clad afloat.

RUSSIA has become a customer for American locomotives. Mr. M. Baird, of the Baldwin Locomotive Works, has just returned from Russia, with a contract for nine engines for the Hango Railway of Finland. These are to be of five-feet gauge, of the ordinary American pattern, with 15 by 25-inch cylinders, 32-inch driving-wheels, and to burn wood. Ten of the engines for Russia have been shipped, and have arrived in that country, and are now being erected.

THE Adrian Car Manufacturing Company's Works, at Adrian, Michigan, were seriously damaged by fire on the 27th ult. The machine and paint-shops were entirely destroyed, and a part of the machinery. Six new coaches were also burned. The interruption to their business will be only temporary.

THE cars of the Burlington and Missouri River Railroad Company have an iron plate running the whole length of the car between the floor and the windows, which is much better than the old plan of wainscoting this space in wood, as the wood shrinks and leaves cracks through which thin draughts of air strike the feet of the passengers. The iron belt is intended to obviate this difficulty. The company is changing about seventy-five of its flat-cars into coal-cars for the transportation of coal from the Iowa mines eastward.

Miscellaneous Items.

MR. CHARLES FELLOWS, who has been for a number of years first grand assistant engineer of the Brotherhood of Locomotive Engineers, and assistant editor of the *Locomotive Engineer's Journal*, has resigned these positions to accept the appointment as general master-mechanic of the new Lake Shore and Tuscarawas Valley Railroad. Mr. Fellows is a gentleman widely known for his ability and experience in mechanical engineering, and we predict for him a successful career in his new vocation.

Mr. J. D. McIlwain, of Cleveland, a valued correspondent of this journal, and having much practical experience in the construction of railway rolling stock, has been appointed superintendent of the car department; Mr. P. G. Van Well takes charge of the machinery, and Mr. Dudley Ball, of the blacksmith-shop. The two last-named gentlemen have formerly been connected with the Lake Shore and Michigan Southern road, and Mr. McIlwain with the Cleveland and Pittsburg car-shops.

THE Chattanooga *Herald* says that the rolling-stock of the Alabama and Chattanooga Railroad is in a terrible condition, owing to the reckless management of the late agents of the State of Alabama, their object seeming to have been to destroy it before allowing the property to pass into other hands. Superb palace-cars were run off the track and dumped into ditches, and there allowed to remain, no effort being made to replace them on the track. Freight and express-cars, locomotives, etc., were similarly treated, and it is estimated that it will cost the company over half a million dollars to put the rolling-stock into condition for use. Mr. Stanton, the superintendent, is working energetically with this object in view; but the labor accumulates, new batches of wrecked cars being brought in daily.

THE Lombard car-factory and machine-shop at Augusta, Maine, has been greatly enlarged. Last spring, Colonel Lombard purchased seven and one half acres of land contiguous to his former place of operations, and erected a foundry, machine and wood-shop, and other connecting and necessary buildings. The capacity of the car-shop is two cars daily. All the buildings are erected on an extensive scale and furnished with the best and most improved machinery. The blacksmith shop has three forges and sand and clay floor, rendering it comparatively fire-proof. This has facilities for turning out the iron-work for three cars a day. The foundry is of greater capacity than present needs may demand, as it is the intention of the proprietor soon to engage in the extensive manufacture of car-wheels.

MR. CHARLES M. BOWMAN, of Lebanon, Pa., has received letters-patent for an improvement on station indicators for railway-cars. The invention consists of a band or ribbon of suitable material, having the names of successive stations upon it, stretched across the centre of the dome of the car, or in other convenient places, and coiled on drums, which are connected by vertical shafts with gearing beneath the car, operated at proper periods by a driving-wheel coming in contact with short sectional rails located at suitable points between the stations, so as to indicate the name of the place as the cars arrive.

A TRIAL was recently made on the seventeen-mile grade of the Baltimore and Ohio Railroad, of an "eight-wheel connected mogul" locomotive, built at the Baldwin Locomotive Works at Philadelphia, and owned by the Cumberland and Pennsylvania Railroad. Its performance was highly satisfactory, if not surprising. It drew up the grade a train of thirty-eight empty coal-hoppers and the private car of Mr. F. Mantz, general supervisor of trains of the Baltimore and Ohio Railroad, filled with officials of the road and spectators. The camel engines used by the company pulled up the above-named grade twenty-one hoppers, and the ten-wheel engine eighteen.

THE Cartersville *Standard* says, Messrs. H. Padgett and Charles B. Wallace, managers of the Cartersville Car-Works, have just concluded a contract with the officers of the Western and Atlantic Railroad Company to build one hundred freight-cars—the wheels, axles, and other irons to be made at Rome, of Georgia iron, and the wood-work to be of the best Georgia pine, to be completed at the car-works in this city in the next ten weeks, or at the rate of ten cars per week. The above railroad company have been testing cars built at this factory for the last twelve months, and pronounce them the best in use on their road.

A WRITER in *Scribner's Magazine* gives the following statistics concerning the Tredegar Iron-Works at Richmond, Va.: "The forge was established in 1835. Increasing in its operations with the growth of the city and the production of native iron, it now employs a million of dollars of capital and nearly two thousand workmen, and converts tens of thousands of the crude metal into rails, spikes, axles, joints, car-wheels, boilers, engines, and all kinds of machinery. A special manufacture is a freight-car of great strength and durability, of which large numbers are sent to every part of the country. The buildings cover a space of fifteen acres."

A NEW pay-car has lately been completed at the shops of the Chicago and Alton Railroad at Bloomington, Ill., which is described as being unusually convenient and comfortable. The business office is at one end of the car, and is provided with the necessary desks and counters. Next to it is the paymaster's private room, adjoining which are the sleeping apartments. Adjoining these again are the kitchen and dining-room, which open out upon a spacious veranda which occupies the end of the car. The car is carried on two six-wheel trucks, and is furnished in a very elaborate manner.

A NEW office for the General Eastern Passenger Agent of the Kansas Pacific road has been opened at No. 317 Broadway, New-York, in which will be kept a fine display of cereals and other products of the soil along the line, samples of coal and building-stone, minerals, etc. Full files of newspapers published in their towns will also be kept there, and those who live along the line when traveling east can have their letters and telegrams sent to the above address, where they will be safely kept and delivered on application. A large map of the country tributary to the Kansas Pacific Railway will be exhibited, together with fine views of the natural scenery obtained from local and other photographers. In addition to the foregoing, plats of towns and maps of lands for sale will be forwarded regularly from the land-office and kept on file.

THE Pennsylvania Railroad Company have purchased a large piece of ground between the Jersey City and Pavonia Ferries, and will make it the terminus for their branch-line, which will run through the city on arches. The water-right, shore-property, and right-of-way to Bergen Hill, cost in all nearly two millions of dollars.

THE president of the Philadelphia, Wilmington, and Baltimore Railroad says that within the past six years but one passenger has been killed on the trains, and he fell from the car while intoxicated, and only two passengers have been injured; both of whom were upon the platforms in violation of rules. The road has been using steel rails since 1864, and for some years have bought no iron rails.

GENERAL HORACE PORTER, for nearly four years Private Secretary of President Grant, has resigned that office for the purpose of accepting the vice-presidency of the Pullman Palace-Car Company. His extended acquaintance with railroad men, admirable address, and habits of discipline, system, and organization, acquired by his long connection with the Ordinance department, give him peculiar qualifications for his new position.

It has been decided by a New-York City court that a street-car company is liable for damages inflicted on a passenger wrongfully put off by a conductor. In this particular case it was shown that instructions were given to eject passengers in certain cases. Ignorant enforcement of those instructions wronged a passenger. So the court awarded exemplary and compensatory damages to the plaintiff, and the street-car companies receive another lesson for their guidance.

A new line of street-cars has been put in operation in New-York, running on Twenty-third street across the island from river to river. The rolling-stock consists of twenty-six cars seating sixteen passengers each, and drawn by one horse. There are no conductors, the driver collecting the fares by means of the patent Slawson box. There is a turn-table at each end of the road.

On Sunday, Nov. 17th, the gauge of the Grand Trunk Railroad from Sarnia to Buffalo, a distance of one hundred and ninety-five miles, was changed from wide to narrow without delay to passenger-trains. The work was performed by six hundred men distributed at a hundred different points. At the car-shops eight hundred freight and ten passenger-cars have been completed for the new gauge, and a sufficient number of locomotives have been procured to operate the road from Detroit to Buffalo.

At a meeting of the board of directors of the Jacksonville Car Manufacturing Company, held at Jacksonville, Ill., December 2d, Col. E. C. Kreider was chosen President, and W. E. Veitch, Secretary and Treasurer, for the ensuing year. The capital stock at present amounts to $37,000, which will, when necessary, be increased to $100,000, or more. As soon as the weather will permit, the company will erect their shops near the junction of the Chicago, Alton, and St. Louis, and Toledo, Wabash, and Western railroads, and will doubtless be in successful operation some time during next summer.

Mr. George Holton, for the past eight years master-mechanic at the Weldon shops of the Illinois Central Railroad in Chicago, was recently presented, on behalf of the employees, with $800 in five-twenty bonds, and an elegant silver tobacco-box. The presentation speech was made by Mr. S. J. Hays, the superintendent of machinery.

A gentleman in Pottsville has received letters-patent for a self-lubricating car-wheel, axle, and truck, readily applied to all kinds of car-wheels and trucks, and when properly adjusted lubricating without renewal for six to nine months.

Over three hundred cars have been manufactured by the Litchfield, Ill., Car Company since it commenced business, a few months ago. About forty wheels is the average work of the foundry of the company per day.

The New-York Central Railroad Company have commenced the erection of a new paint-shop at their car-works at West-Albany. It will be the largest shop of the kind in the world, and will hold eighty-eight cars. The materials of construction are brick and iron, and its dimensions 130 x 600 feet.

It has been computed that there is standing in the forests of Michigan, at the present time, over 40,000,000,000 feet of mercantile pine timber. It is estimated that, if the consumption in the States continues to increase in the same ratio as in the past few years, the pine forests will be entirely swept away within eight years.

A company has been formed to build a new rolling-mill at Springfield, Ill., at the junction of the Chicago and Alton and the Toledo, Wabash, and Western railroads, a short distance south of the city. The capital stock is $350,000, of which $300,000 has been subscribed. Ground is to be broken at once.

The American Car Company of Paris, Ill., have received a certificate of incorporation from the Secretary of State.

The business of the Chicago, Rock Island, and Pacific road already exceeds its capacity. The company has not cars enough to carry its freight, nor can it get them, the car-builders being already six months in arrears with their orders. There is much complaint among shippers because they can not get cars, and there is danger that many dealers in grain with small capital will go under because cars can not be had to take their grain to market, thus enabling them to promptly realize on their stock. The company is doing all in its power to accommodate the public, but the increase of traffic is more than was expected.

A number of the capitalists of Springfield, Illinois are discussing the expediency of establishing car works at that place.

Wm. M. McPherson, one of the leading railroad men of St. Louis, died recently in that city. He had been a leading director of the Pacific of Missouri and the late North-Missouri, and also of the Kansas Pacific, and was a director of the St. Louis, Kansas City, and Northern, and the Kansas Pacific at the time of his death.

Mr. E. B. Gibbs, late master-mechanic of the Missouri Pacific Railroad, and formerly master-mechanic of the St. Louis and Iron Mountain Railroad, has accepted a similar position on the Louisville, Cincinnati, and Lexington Railroad, with headquarters at Louisville.

A new locomotive called "Buffalo," to be used on a Western New-York railroad, has as a frontispiece an elegantly mounted buffalo-head.

Mr. M. C. Andrews, long master car-builder of the New-York and New-Haven Railroad, has resigned, and Mr. James Danvers has been appointed to succeed him.

The Cairo Short-Line Railroad is receiving one hundred new box-cars for White Line use, made at Erie, Pa.

The Pittsburg, Fort Wayne, and Chicago Railway Company have begun the work of renewing their track with steel rails.

Mechanical and Scientific.

Decorative Painting on Tin.—Tinfoil is spread out upon a smooth surface, such as glass, the latter having been first moistened to aid the laying out of the foil and to maintain it in its position. The painting is then executed upon it in oil. This painting on tin, when dried and varnished, can be rolled up like ordinary paper hangings, from which it essentially differs in possessing all the variety of tones and coloring that oil paintings admit of. The tin groundwork constitutes a waterproof protection, and, on account of its great flexibility, will follow the various mouldings and contours of the object to be ornamented. To the latter should be applied a hydrofuge mixture, when it will be ready for the decorator. This method can replace ordinary gilding, as the gold can be applied in the work-shop, and the gilt tin fixed afterward. The advantage of gilt tin over gilding on other metals is that it is inimical to oxidation; whereas it is known that gilding upon other metals, and notably upon zinc, deteriorates rapidly.

Rubber Cement.—As rubber plates and rings are nowadays used almost exclusively for making connections between steam and other pipes and apparatus, much annoyance is often experienced by the impossibility or imperfection of an air-tight connection. This is obviated entirely by employing a cement which fastens alike well to the rubber and to the metal or wood. Such cement is prepared by a solution of shellac in ammonia. This is best made by soaking pulverized gum shellac in ten times its weight of strong ammonia, when a slimy mass is obtained, which in three to four weeks will become liquid without the use of hot water. This softens the rubber and becomes, after volatilization of the ammonia, hard and impermeable to gases and fluids.

Durability of Different Woods.—Experiments have been lately made by driving sticks made of different woods, each 2 feet long and 1½ inches square, into the ground, only ½ inch projecting outward. It was found that in five years, all those made of oak, elm, ash, fir, soft mahogany, and nearly every variety of pine, were totally rotten. Larch, hard pine, and teak-wood were decayed on the outside only; while acacia, with the exception of being also slightly attacked on the exterior, was otherwise sound. Hard mahogany and cedar of Lebanon were in tolerably good condition; but only Virginia cedar was found as good as when put in the ground. This is of some importance to builders.

A Superior Glue.—Dissolve three parts of India-rubber in thirty-four parts of naphtha. Heat and agitation will be required to readily effect the solution. When the rubber is completely dissolved, add sixty-four parts of finely-powdered shellac, which must be heated in the mixture until all is dissolved. This mixture may be obtained in sheets like glue, by pouring it, when hot, upon plates of metal, where it will harden. When required for use, it may be simply heated in a pot till soft. Two pieces of wood or leather joined together with this glue can scarcely be sundered without a fraction or tearing of the parts.

Place for a Thermometer.—It should be in an open space, out of the vicinity of high buildings, or any object that impedes the free circulation of air. It should face the north, so as to be always in the shade, should be 12 inches from every neighboring object, should be about 15 inches from the ground, and should be protected against its own radiation to the sky, and against the light reflected from neighboring objects or the ground itself. The thermometer should be read as rapidly as possible, as the heat from the body or the breath influences the instrument.

New Publications.

The Cabinet-Maker.—We take pleasure in announcing that the publication of this excellent trade journal has been resumed, after a brief suspension caused by the destruction of its office and materials in the great fire on the 10th of November. A journal so well established and ably conducted, and so indispensable to the cabinet-trade as a medium of information and trade-news, could not, in the nature of the case, long remain in eclipse, yet its disappearance for a brief month created a vacancy in our exchange-list which we are glad to have filled again.

Harkness's Magazine.—We have received the second number of this new quarterly magazine, published at Wilmington, Del., and conducted by Professor John C. Harkness, of the State Normal University of that city. It contains nearly a hundred pages of interesting matter, embracing topics pertaining to educational progress and mechanical and business enterprise. Although devoted largely to local interests, it contains much that can not fail to be acceptable and edifying to the general public. It is illustrated with numerous well-executed and appropriate engravings. Price, one dollar a year.

Across the Continent.—This is the name of a weekly journal just started in Philadelphia, and devoted to railways, steam-navigation, and productive industry. It is well printed, and its editorial and selected matter display ability and discrimination. A. R. Woolston, editor; price, two dollars a year.

The St. Louis Railway Register, published weekly in St. Louis, has just completed the first year of its existence. As an interesting and reliable medium of railway intelligence, it is deserving of the liberal support which, we are glad to say, it has already received. The proprietors contemplate increasing its size and otherwise improving its general appearance. Price, two dollars a year.

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Publisher's Notices.

BUFFALO STEAM-GAUGE COMPANY.—The proprietors of this well-known establishment, Messrs. Ray & Marvin, whose advertisement will be found on our 17th page, are about enlarging the capacity of their works to accommodate their increasing business. The head-lights and steam-gauges manufactured by them are conceded to be of superior excellence by all who have given either a practical trial. The former are provided with hard-wood bottoms, and a new style of burner which does not obstruct the draught. The company have constantly in hand large orders from leading railroads for both the above-named articles. One thousand of their steam-gauges have been furnished to the Westinghouse Air-Brake Company during the past year, and gave such entire satisfaction that a second order for the same number is now being filled. The works also manufacture a variety of lamps for railroad purposes, including cab, target, revolving-signal, engineers', and hand-lamps.

COBB'S PATENT ELLIPTIC STEEL SPRING.—This device, already known upon many leading lines of road, is specially adapted to car-seats and sleeping-car mattresses. We question if any plan has yet been discovered which gives to a car-seat cushion the agreeable spring and elasticity so desirable for the comfort of travelers, and which is so little liable to get out of order, or so easily and cheaply repaired, as the above-named springs. We invite the attention of those who have not yet given them a trial, to the proprietor's advertisement and accompanying cut on page 24, which will convey a very clear idea of the operation of the springs, and the way in which they are arranged in the seat. Each is secured in its place by being fastened to slats, and the tops kept in position by webbing, as shown in the cut. For convenience in repairing, the springs in a seat are divided into six sets or sections, so that any one of them can be got at by simply removing the screws at the end of the slat, without disturbing the upholstery. This is a very great advantage, as will readily be seen, over former methods. No expense is spared by the manufacturers in obtaining the very best quality of steel to be found in this country or in Europe; and if on this account any objection should be made to the price of the springs, it is more than compensated in the saving of hair, the gain in elasticity, durability, and comfort, an even surface to upholster, and the ease with which they are cleansed. They have now been in use nearly three years, and, according to the estimate of the proprietors, nearly a thousand cars, including many of the Pullman palace-coaches, are already equipped with them. Did our space permit, we could refer in detail to a large number of flattering testimonials submitted to us, bearing the signatures of car-superintendents of important roads in all parts of the country, and of palace and sleeping-car lines. We have no hesitation in recommending the spring for general adoption in the construction of car-seats, mattresses, etc.

The Struggle for Gentility.

IN all our great cities the rush for mental labor and sedentary pursuits, with the view to avoid manual toil, is tremendous. At whatever cost of self-abasement, the glittering bauble of gentility is sought for by American-born young, so that it may not be said, "He is only a common mechanic." They forget, or have never been taught, that the greatest men of the age have sprung from the working-men. Eventual success in early life is a question of brains, not position. Let those in search of clerkships and other similar situations remember this great truth. Why should the badge of serfdom be assumed by those who choose to work where they are not really needed, in preference to where they are? By such a course, nobility of soul is sacrificed, and a recompense, at starvation rates, is accepted, in order that the sniveling mendicant may have the world say that he is engaged in a *respectable* vocation—one that exempts him from manual labor. Shame on such a false standard of public opinion!

The trouble is that more persons insist upon living by commercial pursuits, literature, or in some way that involves but little manual effort, than can possibly find employment. They can only find it by taking it from some one else. Many succumb to the worst forms of vice, under the pressure of absolute want. They run into temptation, and make that temptation an excuse for pauperism and crime. Let the young men of this land get an education if they possibly can, but by all means let them learn a trade.—*Exchange.*

A Novel Tenoning-Machine.

AT the Oswego shops of the New-York and Oswego Midland Railroad there is a tenoning-machine, devised by Mr. B. T. Day, which is something of a novelty. It consists of twenty-four circular saws set upon a mandrel. The mandrel is movable in vertical guides, and the stick is presented horizontally to the saws, which are placed so near together, where the wood is to be removed, as to take it all away in the sawing. The washers between the saws are just thick enough to prevent the teeth from touching. The saws are separated from each other where the tenon is to be by thicker washers, and can in a few minutes be adjusted to suit any job. Any saw that is dull can be taken out very easily, and another substituted in its stead. This is all there is of it. The entire arrangement is so simple as hardly to be entitled to the name of machine, but is more properly a tool, and a very useful and convenient one in a car-shop. It will work as fast as a man can feed it, and the quality of the work is as perfect as need be desired.

Immense Hammer and Anvil.

THE largest portion of the stupendous steam hammer to be erected in the royal gun factories at Woolwich, for the more expeditious manufacture of heavy guns, was recently cast in the Dial Square of the Royal Arsenal. The weight of metal used in the casting was one hundred and three tons, which was first collected from a number of furnaces in three immense receptacles, and from them poured into the mould, which had been carefully prepared below the level of the floor. While the casting is cooling the last of the large plates used in the foundations will be made, the weight of this plate being ninety eight tons. There will be then only the anvil face to cast—a mere trifle of sixty tons—and then the bed of the hammer will be complete, its total weight, down to the piles upon which it rests, being about six hundred and fifty tons. The weight of the falling mass, which answers as the hammer-head, will be thirty-four tons, the most ponderous hammer in the kingdom.

Facetiæ.

SOME Michigan boys, feeling the need of a wholesome recreation, stuffed a suit of clothes with straw and buried it; killed a couple of chickens, and strewed the blood around the grave, and trampled the ground so that it gave evidence of a fearful struggle. The horrified citizens soon discovered the grave, summoned the coroner, had a jury impaneled, dug up the body, and —adjourned in a hurry.

"WHO be those Dolly Varding, the babers make so much talk mit?" asked a Dutchman.

"She keeps a place up-town—one of those concerns, you know," was the reply.

"Yaw, I knows her! If she vas a nice voman, the babers never makes her name in dypes. Dem editors knows more as hell about such vimmins, and make good folks read all der dime. The next paper makes Dolly Varding in him I shoost make him into sausage, an't it?"

A WAG went to a railroad-station one evening, and finding the best car full, said in a low tone, "Why, this car isn't going." Of course this caused a general stampede, and the wag took the best seat. In the midst of the indignation, the wag was asked, "Why did you say this car wasn't going?" "Well, it wasn't then," replied the wag, "but it is now."

A FEW days since, a seedy person applied to a wealthy citizen for help, and received the small sum of five cents. The giver remarked as he handed him the pittance, "Take it, you are welcome; our ears are always open to the distressed." "That may be," replied the recipient, "but never before in my life have I seen so small an opening for such large ears."

A TOPER got so much on his stomach the other day that said organ repelled the load. As he leaned against a lamp-post vomiting, a little dog happened to stop by him, whereupon he indulged in this soliloquy: "Well, now, here's a conundrum. I know where I ate the baked beans, I remember where I ate that lobster, I recollect where I got that rum; but I'm hanged if I can recall where I ate that little yaller dog."

A DANBURY boy, whose imagination had become diseased by too close devotion to dime-novels, started off yesterday to seek fame as a slayer of bears and Indians. He took all his toys, including a hand-sled and a snare-drum, bade his little brothers and sisters an affectionate farewell, and was gone nearly two hours.

AN inebriate stranger precipitated himself down the depot-stairs, and, on striking the landing, reproachfully apostrophized himself with, "If you'd been a wantin' to come down-stairs, why'n thunder didn't you say so, you wooden-headed old fool, an' I'd a come with you and showed you the way?"

"I AM a self-made man," said a native of Stonington, the other day, to a New York gentleman, with whom he had been driving a sharp bargain. "Glad to hear you say so," responded the New-Yorker, who had been worsted in the trade, "for it relieves the Lord of a great responsibility."

"NOW, John, suppose there's a load of hay on one side of the river, and the river's too deep to swim, how can the jackass get to the hay?" "I give it up." "Well, that's just what the other jackass did."

THE latest Yankee invention is a new-fashioned traveling-bag, in which a man can stow himself upon a journey and travel without the knowledge of such sponges as dun a man for his fare. He places himself in the bag, and taking it in his hand, passes for baggage.

THE only way to get pure port wine is to go to Oporto yourself, raise the grapes, press the wine, put it into the cask yourself, and ride on it all the way home.

MISS PARTINGTON writes to her aunt that the bridal wave, which the papers talk so much about, has not touched that town for six years.

WENDELL PHILLIPS says, Put an American baby six months old on its feet, and he will immediately say, "Mr. Chairman," and call the next cradle to order.

A PENNSYLVANIA farmer at an auction bought an old hearse, because he'd "been wanting a rig of some kind to take Mariar and the children to circuses and fairs, and haul potatoes in."

IT requires more delicacy of touch, a better acquaintance with the inner emotions of the heart, and grander pathos of sentiment, to make a declaration of love than it does to put up a stove.

THE highest office within the gift of the government is the superintendency of the weather signal station on Pike's Peak, which is fourteen thousand feet above the sea-level.

AT no moment of difficulty does a husband, knowing his own utter helplessness, draw so closely to his wife's side, for comfort and assistance, as when he wants a button sewed on his shirt-collar.

A LEAVENWORTH editor doesn't now spend time watching the little busy wasp that gathered lint in his sanctum to make its nest. He came in one day and did not observe that the wasp was sitting in his chair

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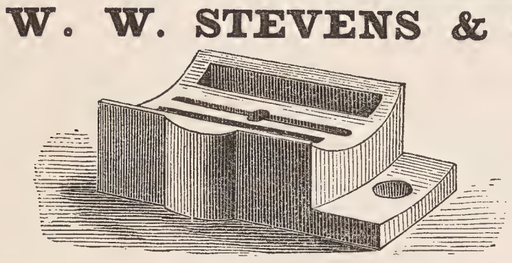

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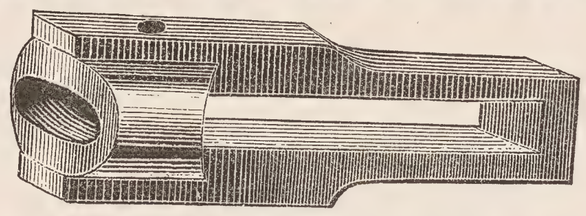

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Barney & Smith Manufacturing Co	Dayton, Ohio.
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Billmeyer & Smalls	York, Pa.
Bradley, Osgood	Worcester, Mass.
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Brill, J. G. & Son	Philadelphia, Pa.
Bitner, George W	Pittsburg, Pa.
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Canada Car Co	Toronto, Canada.
Canda, F. E. & Co	Chicago, Ill.
Canada Steam-Engine Co	Kingston, Canada.
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Central Car & Manufacturing Co	Jackson, Mich.
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Cummings Car-Works	Jersey City, N. J.
Connellsville Machine and Car Co	Connellsville, Pa.
Corunna Car Co	Corunna, Mich.
Detroit Car and Manufacturing Co	Detroit, Mich.
Detroit Car Works	Detroit, Mich.
Dawson Manufacturing Co	Dawson, Ga.
Dickey, Neill & Co	Toronto.
Dickson Manufacturing Co	Scranton, Pa.
Erie Car-Works	Erie, Pa.
Elmira Car-Works	Elmira, N. Y.
Fredericks & Co	Catasauqua, Pa.
Fremont Car Co	Fremont, Ohio.
Gardner, F. & Co.	Carlisle, Pa.
Gill, John L	Columbus, Ohio.
Gilbert, Bush & Co	Troy, N. Y.
Goold, James & Co	Albany, N. Y.
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Haskell & Barker	Michigan City, Ind.
Harrisburg Car Manufacturing Co	Harrisburg, Pa.
Heathcote, Herbst & Co	Glen Rock, Pa.
Hamilton, William & Son	Toronto.
Harlan & Hollingsworth Co	Wilmington, Del.
Indiana Car Co	Cambridge City, Ind.
Indianapolis Car Co	Indianapolis, Ind.
Jackson & Sharp Co	Wilmington, Del.
Jackson & Woodin Manufacturing Co	Berwick, Pa.
Jones, J. M. & Co	West-Troy, N. Y.
Kimball Manufacturing Co	San Francisco, Cal.
Keith, H. T. & I. N	W. Sandwich, Mass.
Laporte Car Manufacturing Co	Laporte, Ind.
Lombard, Thomas	Augusta, Me.
Lebanon Manufacturing Co	Lebanon, Pa.
Lehigh Car Manufacturing Co	Stemton, Pa.
Litchfield Car Manufacturing Co	Litchfield, Ill.
Stephenson, John & Co	New-York, N. Y.
Michigan Car Co	Detroit, Mich.
McNairy, Claflen & Co	Cleveland, Ohio.
Murray, Dougall & Co	Milton, Pa.
McVay, Walker & Co	Braddock's Field, Pa.
Mowry Car and Wheel Works	Cincinnati, O.
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Missouri Car and Foundry Co	St. Louis, Mo.
New-Haven Car Co	New-Haven, Ct.
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Ontario Car Co	London, Ont.
Patten Car Works	Bath, Maine.
Peabody & McDonald	Calais, Me.
Peters, Simon	Quebec.
Pittsburg and McKeesport Car Co	McKeesport, Pa.
Pittsburg Car and Locomotive Co	Pittsburg, Pa.
Portland Co	Portland, Me.
Pullman Car Co	Chicago.
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Ranlet Car Manufacturing Co	Laconia, N. H.
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Schall, Michael	York, Pa.
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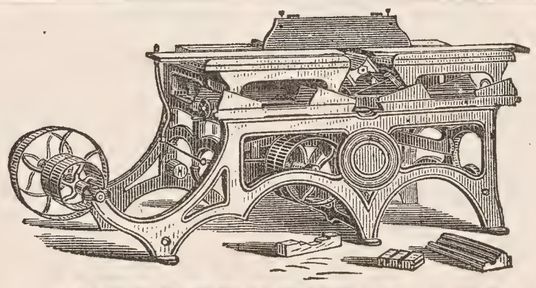

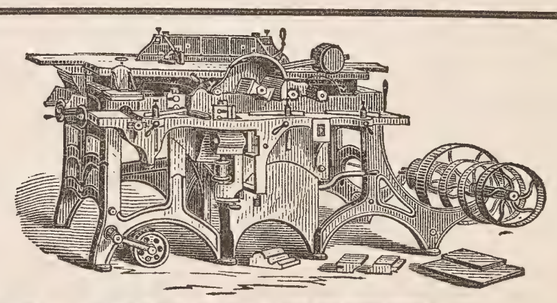

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Galesburg Division	Wm. Wilson		Galesburg, Ill.
Quincy Division	Joel West		Quincy, Ill.
Burlington Division	S. E. Burtch		Burlington, Ill.
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Chicago, Dubuque & Minnesota	J. G. Crockett		Dubuque, Iowa.
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Chicago, Danville & Vincennes	J. A. Wood	W. H. Dunham,	Momencee, Ill.
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Central R. R. of Iowa	O. R. Ford	O. R. Ford	Marshall, Iowa
Central Pacific	A. J. Stevens	Benjamin Welch	Sacramento, Cal.

D

Railroad.	*Master-Mechanic.*	*Master Car-Builder.*	*Residence.*
Dayton & Union	A. J. Keenan	J. F. Feicht	Dayton, Ohio.
Danbury & Norwalk	Charles A. Craig		Danbury, Ct.
Dayton & Michigan	William Cullen	W. H. Allison	Cincinnati, Ohio.
Denver & Rio Grande	John Greenwood		Denver, Col.
Delaware, Lackawanna & Western	Walter Dawson	Robert McKenna	Scranton Pa
Des Moines Valley	James Lamb	R. E. Smith	Keokuk, Iowa.
Detroit & Milwaukee	Andrew Wilson		Detroit, Mich.
Detroit, Lansing, & Lake Michigan	Tho. G. Roberts		Detroit, Mich.
Delaware & Hudson Canal Co	James Dickson	Thomas Orchard	Carbondale, Pa.
Rensselaer & Saratoga Div	W. B. Gage		Troy, N. Y.
Dorchester & Delaware			Cambridge, Md.
Dubuque South western	I. M. Smith	I. M. Smith	Farley, Iowa.
Dutchess & Columbia	W. G. Vanbuskirk	H. A. Webster	Fishkill, N. Y.
Dunkirk, Warren & Pittsburg	J. C. Haggett	J. C. Haggett	Dunkirk, N. Y.

E

Eastern		J. P. Somerby	Salem, Mass.
Eastern	John Thompson		East-Boston, Mass.
East-Tennessee & Virginia	Eli Hixon	Jos. Armbruster	Knoxville, Tenn.
East-Tennessee & Georgia	Eli Hixon		Knoxville, Tenn.
East Pennsylvania		Samuel Reeves	Reading, Pa
Elizabethtown and Paducah	W. D. Robb	T. A. Cordrey	Elizabethtown, Ky.
Erie Railway	‖M. E. Brown		Susquehanna, N. Y.
Erie Railway	James B. Gregg		Susquehanna, N. Y.
Erie Railway	H. L. Brown	C. A. Smith	Jersey City, N. J.
Erie Railway	J. G. Hubbard	M. Wilder	Buffalo, N. Y.
Erie Railway	W. E. Cooper	W. E. Cooper	Hornellsville, N. Y.
Erie Railway		W. E. Rutter	Elmira, N. Y
Evansville & Crawfordsville	John L. White	Joseph Stiker	Evansville, Ind.
Evansville, Henderson & Nashville	H. M. Smith	W. H. H. Price	Henderson, Ky.
European & North Am. (of Maine)	A. O. Bailey	J. H. Brown	Oldtown, Maine.
Erie & Pittsburg	John Young	John Young	Erie, Pa.
Evansville, Terre Haute, & Chicago			Terre Haute, Ind.

F

Flushing & North Side			
Florida	A. W. Taylor	G. Hernandez	Fernandina, Fla
Flint & Pere Marquette	Sanford Keeler	Sanford Keeler	East-Saginaw, Mich.
Fitchburg	Geo. A. Cooledge	Enos Varney	Charlestown, Mass
Fitchburg & Worcester	John Webster	Samuel Stevens	Fitchburg, Mass.

G

Grand Trunk		Warren Noyes	Gorham, Me.
Grand Trunk	†Richard Eaton	J. W. W. McWood	Montreal, Canada.
Grand Trunk		Howard Fry	Sherbrooke, Can.
Grand Trunk		B. J. Mitchell	Portland, Me.
Galveston, Houston & Henderson	Wm. Macbeth	Wm. Macbeth	Galveston, Texas.
Grand Rapids & Indiana	J. M. Boon		Fort Wayne, Ind.
Great Western of Canada	†Wm A. Robinson	F. Childs	Hamilton, Canada.
Georgia	William Hardman	T. M. Preval	Augusta, Ga.
Greenville & Columbia	J. T. Price	J. T. Price	Helena, S. C.

H

Harlem Extension	George W. Blanchard		Rutland, Vt.
Harlem Extension		C. S. Clapp	Bennington, Vt.
Hanover Branch	John J. Bingley	Henry Britcher	Hanover, Pa.
Hartford & New-Haven	John O. Chapman	F. Leppense	Hartford, Ct.
Hannibal & St. Joseph	H. A. Towne.	H. C. Whiting	Hannibal, Mo.
Hartford, Providence & Fishkill	Edwin Garfield	V. D. Perry	Hartford, Ct
Hackensack & New-York	Abra'm Angausen		Hackensack, N. J.
Housatonic	C. R. Morris	J Ferris	Bridgeport, Ct.
Houston & Texas Central		F. S. Tull	Houston, Texas.
Houghton & Ontonagon			L'Anse, Mich.
Houston Tap & Brazoria	T. J. Shellhorn	T. J. Shellhorn	Houston, Texas.
Huntington & Broad-Top Mountain	D. G Gilchrist	M. Tellerhoof	Saxton. Pa.
Hempfield	T. Marsh		Wheeling, Va.
Houston & Great Northern	T. J. Shellhorn	T. J. Shellhorn	Houston, Texas.

I

Indianapolis, Cincinnati & Lafayette	J. S. Patterson	S. Griffith	Cincinnati, Ohio.
Indianapolis, Peru & Chicago	John McKenna	John McKenna	Peru, Ind.
Illinois Central	†S. J. Hayes	H. O. Wadlie	Chicago, Ill.
Chicago Division	George Holton		Chicago, Ill.
South ivision	David Oxley		Centralia, Ill.
North Division	J. B Edams		Amboy, Ill.
Iowa Division	Thomas W. Place		Waterloo, Iowa.
Iowa & Missouri State Line			Farmington, Iowa.
Iron	Perry Scott	Clem. Roetling	Ironton, Ohio.
Indianapolis & St. Louis	Wm. Barkla	R. B. More	Mattoon, Ill.
Indianapolis, Bloomington & Western	Tho. V. Losee	Tho. V. Losee	Urbana, Ill.
Ionia & Lansing	H. Loughlin		Lansing, Mich.
Indianapolis & Vincennes	A. E. Allcott		Indianapolis, Ia.

J

Jeffersonville, Madison & Indiana	Reuben Wells	John Higgins	Jeffersonville, Ind.

K

Knox & Lincoln			Bath, Maine.
Kentucky Central	J. R. Ledyard	J. L. Hackathorn	Covington, Ky.
Knoxville & Charleston			Knoxville, Tenn.
Kansas Pacific	**L. H. Waugh		Wyandotte, Kansas.
Denver Pacific Div	**L. H. Waugh		Wyandotte, Kansas.
Denver & Boulder Valley Div	**L. H. Waugh		Wyandotte, Kansas.
Junction City & Ft. Kearney Div	**L. H. Waugh		Wyandotte, Kansas.
Arkansas Valley Div	**L. H. Waugh		Wyandotte, Kansas.
Kalamazoo, Allegan & Grand Rapids			Kalamazoo, Mich.
Kansas City, St. Joseph & Council Bluff	H. L Cooper	H. L. Cooper	St. Joseph, Mo.

L

Lake Erie & Louisville	John Pero		Fremont, Ohio.
Lake Superior & Mississippi	W. McFarland	A Coburn	St. Paul, Minn.
Lackawanna & Bloomsburg	Chas. Graham		Kingston, Pa.
Lehigh Valley	John I. Kinley		South-Easton, Pa.
Lehigh Valley	P. Hofecker	E. R. Brown	Weatherly, Pa.
Lehigh Valley	A. Mitchell	Mauch Chunk, Pa.	Delano, Pa.
Lehigh Valley	D. Clark		Hazleton, Pa.
Leavenworth, Lawrence & Gal	S. M. Philbrick		Lawrence, Kansas.
Little Rock & Fort Smith	A. Klohs		Little Rock, Ark.
Little Miami	J. H. Setchel.		Cincinnati, Ohio.
London & Port Stanley			London, C. W.
Louisville, New-Albany & Chicago	Jacob Losey	Jacob Losey	New-Albany, Ind.
Long Island	Chs. A. Thompson.		Hunter's Point, L. I.
Louisville, Cincinnati & Lexington	E. B. Gibbs	S. S. Pilson	Louisville, Ky.
Louisville & Nashville	†Thatcher Perkins		Louisville, Ky.
Louisville & Nashville	Jas. Montgomery		Bowling Green, Ky.
Louisville & Nashville		Isaac Owens	Louisville, Ky.
Louisville & Nashville	Tho. Welsh		Memphis, Tenn.
Louisville & Nashville	Richard Dolby		Edgefield, Tenn.
Louisville & Nashville	Wm. Russell		Decatur, Ala.
Louisville & Nashville	D. P. Rennie		Birmingham, Ala.
Nashville & Decatur Division	C. D. Knowles		Nashville, Tenn.
South & North Ala. Div	John Skidmore		Birmingham, Ala.
Lake Shore & Michigan Southern	‡James Sedgley	††John Kirby	Cleveland, Ohio
Michigan Southern Division	William Hill		Elkhart, Ind.
" " "		S. S. Knapp.	Adrian, Mich.
Toledo Division	Geo. H Tier	Frank O. Bray	Norwalk Ohio
Erie Division	L. O. Gassett	J. Withyecombe.	Cleveland Ohio.
Buffalo Division	B. H. Kidder	A. Robson	Buffalo, N Y.

M

Marquette & Ontonagon	A. P. Burroughs	H. D. Lyons	Marquette, Mich.
Macon & Augusta			Macon, Ga.
Maine Central	J. W. Philbrick	J. W. Philbrick	Waterville, Me.
Macon & Western	D. M. Gogul	James A. Knight	Macon, Ga
Manchester & Lawrence	Chas. L Eastman.	M. W. Dickerman.	Concord, N. H

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Macon & Brunswick	M. Thornton	M. Thornton	Macon, Ga.
Marietta & Cincinnati	E. Bosley	E. Bosley	Chillicothe, Ohio
Memphis & Little Rock	N. Greener	C. W. Wooldridge	Huntsville, Ark.
Memphis & Charleston	Michael Burk	A. W. Drew	Memphis, Tenn.
Memphis & Charleston	H. N. Burford	Fabien Varin	Huntsville, Ala.
Mineral Point	Robert Hay		Mineral Point, Wis.
Mississippi & Tennessee	James Eblen	James Eblen	Memphis, Tenn.
Mississippi Central	Henry Gibbon	John E. Becton	Water Valley, Miss
Maryland & Delaware	Samuel Peters		Greensboro, Md.
Mississippi, Gains. & Tus			Gainsville, Ala.
Midland Pacific			Nebraska City, Neb.
Milwaukee & St. Paul	T. S. Davis	Wm. E. Kettridge	Milwaukee, Wis.
Milwaukee & St. Paul		John Baillie	Milwaukee, Wis
Milwaukee & St. Paul	J. Pattee	D. F. Wilson	Minneapolis, Minn.
Hastings & Dakota Division	C. C. Clements		Hastings, Minn.
Michigan Central	A. S. Sweet, Jr.	J. B. Sutherland	Detroit, Mich.
Grand River Valley Division		James Potts	Jackson, Mich.
J'kson, Lans'g & Saginaw Div.	Andrew Wilson	Andrew Wilson	Jackson Mich.
Montgomery & West-Point	J. McVey	W. H Daniels	Montgomery, Ala.
Montgomery & Eufaula	James McCann	I. E. Holmes	Montgomery, Ala.
Mobile & Montgomery	James McFarland	L. Barham	Montgomery, Ala
Mobile & Girard	William Eyles	A. J. Nix	Girard, Ala.
Mobile & Ohio	L. J. Fleming	John McHugh	Mobile, Ala.
	B. S. Skates	B. S. Skates	Whistler, Ala.
Missouri River, Fort Scott & Gulf	John S. McCrum		Kansas City, Mo
Missouri River, Fort Scott & Gulf		Josiah Stahl	Wyandotte, Kan.
Missouri, Kansas & Texas	C. T. McIlvaney	J. Townsend	Sedalia, Mo.
Missouri, Iowa & Nebraska	Geo. Adams	Geo. Adams	Alexandria, Mo.
N			
Nashville & Chattanooga	John U. Eastman	J. G. Sawyer	Nashville, Tenn.
Nashville & Decatur	C. B. Knowles	C. B. Knowles	Nashville, Tenn.
New-Bedford & Taunton	Robert Chase	Robert Chase	New-Bedford, Mass.
New-Canaan			New-Canaan, Ct.
New-Brunswick & Canada	T. Armstrong	T. Armstrong	S'nt Andrew's, N.B.
New-Haven & Northampton	Henry Fox	Henry Fox	New-Haven, Ct.
New-York & Harlem	Wm. M. Strong	Leander Garey	New-York.
New-York Central & Hudson River	‡G. B. Van Vorst		Albany, N. Y.
New-York Central & Hudson River	Henry Watkeys		Syracuse, N. Y.
New-York Central & Hudson River	Amos Gould		Rochester, N. Y.
New-York Central & Hudson River	Jas. Butman	Wm. Johnson	Buffalo, N. Y.
New-York Central & Hudson River	Wm. Buchanan	John McKenna	New-York.
New-York Central & Hudson River	John Dikeman		East-Albany, N. Y.
New-York Central & Hudson River		Joseph Jones	West-Albany, N. Y.
New-York Central & Hudson River		George Rowe	Niagara Falls, N.Y.
New-York, Boston & Montreal			E. Tarrytown, N.Y.
New-York & Oswego Midland	Wm. H. Griggs	Wm. H Griggs	Oswego, N. Y.
New-York, Providence & Boston	Jas. H. Anderson	Jas. HAnderson	Providence, R. I.
New-York & New-Haven	H. Kittendorf	James Danvers	New-Haven. Ct.
New-London Northern	J. W. Dow	S. W. Caulkins	New-London, Ct.
New-Jersey Midland	J. E. Wiggins	J. E. Wiggins	Godwinsville, N. J.
New-Jersey Southern	Rufus Blodgett		Manchester, N. J.
New-Haven & Derby			New-Haven, Ct.
New-Orleans, Opelousas & Gt. Western	John McCluskey	Matthew Nolan	Algiers, La.
New-Lisbon			Leetonia, Ohio.
New-Orleans & Ohio	John R. Jordan	John R. Jordan	Paducah, Ky.
New-Orleans, Jackson & Gt. Northern	John Conlon	Charles Bartine	New-Orleans, La.
New-Haven, Hartford & Springfield			Hartford, Ct.
Naugatuck		George W. Gray	Bridgeport, Ct.
Newark & Bloomfield	Luke F. Tronson		Hoboken, N. J.
Nova Scotia	W. Johnson		Bedford, N. S.
North-Carolina	Rufus D. Wade	B. G. Sergeant	Co. Shops, N. C.
New-Orleans, Mobile & Texas	Josiah Bettis	W. H. Johnson	Mobile, Ala.
Northern Central	C. M. Lewis		Baltimore, Md.
Northern Central		G. W. Demarest	York, Pa.
North-Lebanon		Henry B. Oves	Lebanon, Pa.
North-Pennsylvania	Franklin Roop	Franklin Roop	Philadelphia, Pa.
North-Eastern	D. W. Haines	A. M. Corrie	Florence, S. C.
Northern	James W. Lander	Albert Langmaid	Concord, N. H.
Northern of New-Jersey	T. W. Demorest		New-York.
Norwich & Worcester	Richard Colburn	G. R. Bentley	Norwich, Ct.
Northern of Canada	P. Clark.	P. Clark	Toronto, Can.
Northern Pacific	§§Geo. W. Cushing		St. Paul, Minn.
O			
Ogdensburg & Lake Champlain	William A. Short	J. R. Ames	Malone, N. Y.
Old Colony & Newport	J. K. Taylor	A. Gleason	Boston. Mass.
Orange, Alexandria & Manassas	James E. Waddey	John T. Nalls	Alexandria, Va.
Oil City & Pithole	George Thompson		Pithole, Pa.
Oil Creek & Alleghany River	J. S. McElroy	Jacob Williams	Corry, Pa.
Oil Creek & Alleghany	H.J.Bookhammer	John Monks	Oil City, Pa
Ohio & Mississippi		M. Contant	Cochran, Ind.
East Division	A. Thompson		Cochran, Ind.
West Division	H. Elliott	E. Martin	East St. Louis, Ill.
Oregon & California	§§J. Brandt.		Portland, Oregon.
P			
Paris & Decatur	John G. Clifford		Paris, Ill.
Panama	Chas. E. Stewart	J. G. Wilson	Aspinwall, N. G.
Pacific of Missouri	§§John Hewitt	John Hewitt	St Louis, Mo.
Pennsylvania	§§G. C. Gardner		Altoona, Pa.
Pennsylvania	H. D. Garrett	I. W. Van Houten	W. Philadelphia, Pa.
Pennsylvania	E. L Caum	Samuel W. Myers	Harrisburg, Pa.
Pennsylvania	G. W. Strattan	John P. Levan	Altoona, Pa.
Pennsylvania	D. O. Shaver	R. S. Ramsey	Pittsburg, Pa.
New-Jersey Division	John Headden	David H. Baker	Jersey City, N.
Philadelphia & Erie	Martin Walls	George J. Mason	Sunbury. Pa.
	W. L Foster	Robt.M.Messimer	Renovo, Pa.
	W. L. Holman	Wm.P. Newcomb	Kane, Pa.
	W. T. Smith.	David Cowley	Erie, Pa.
Philadelphia, Wilmington & Baltimore	S. A. Hodgman	George W. Perry	Wilmington, Del.
Philadelphia & Reading	L. B. Paxson	Aaron Steinbach	Reading, Pa.
Philadelphia, Germ'n & Norris'n	John Moyer	Nathan Pawling	Philadelphia, Pa.
Philadelphia & Baltimore Central	S. D. Danfield	SamuelD.Danfield	Chester, Pa.
Pittsburgh, Cincinnati & St. Louis			
Pittsburgh & Columbus Division	E. Pierce		Dennison, Ohio.
Pittsburgh & Columbus Division		James McGee	Steubenville, Ohio.
Little Miami D ivision		M. P. Ford	Columbus, Ohio.
Little Miami Division	J. H. Setchel		Pendleton, Ohio.
Col., Cin. & Ind. Division	Robert Curtis	Tho. Chamberlain	Columbus, Ohio.
Col., Cin. & Ind. Division	W. H. Purdy	W. H. Purdy	Logansport, Ind.
Peoria & Rock Island	Theo. Mosher		Peoria, Ill.
Pittsburg, Fort Wayne & Chicago	S. M. Cummings	John Marquis	Alleghany, Pa.
Pittsburg, Fort Wayne & Chicago	J. M. Boon.		Fort Wayne. Ind.
Pittsburg, Fort Wayne & Chicago		J. J. Kirkland	Crestline, Ohio.
Pittsburg, Washington & Baltimore	W. H. Harrison	J. M. Rutter	Connellsville, Pa.
Peoria, Pekin & Jacksonville	R. F. Hurd	R. F. Hurd	Pekin, Ill.
Peninsular	T. G. Templeton.		Battle Creek, Mich
Portland & Rochester	John G. Brady	John G. Brady	Portland, Me.
Portland & Kennebec	John Ellis	J. W. Trussel	Augusta. Me.
Portland & Oxford Central	Geo. W. Battles	Geo. W. Battles	Buckfield, Me.
Portland, Saco & Portsmouth	John Donnell		Portland, Me.
Port Royal			Beaufort. S. C.
Port Hope, Lindsay & Beaverton	H. G Taylor	H. G. Taylor	Port Hope, Can.
Port Huron & Lake Michigan	R. C. Stewart	R. C. Stewart	Port Huron, Mich.
Providence, Warren & Bristol	Rufus Smith	J. Brightman	Bristol, R. I.
Portsmouth, Gt. Falls & Monmouth	James Tucker	E. Fall	Union Village, N.H.
Petersburg & Weldon	R. B. Andrews	Alex. Wright	Petersburg, Va.
Providence & Worcester	Joseph Kelly	Olney L. Smith	Providence, R. I.
Poughkeepsie & Eastern	John L. Driscoll	John L. Driscoll	Poughkeepsie, N. Y.
R			
Raleigh & Gaston.	J. B. Gayle	J. B. Gayle	Raleigh, N. C.
Richmond, Fredericksburg & Potomac	H. Kuhn	W. H. Trainham	Richmond, Va.
Richmond, Danville & Piedmont	John McFarland	H. Longest	Richmond, Va.
Richmond & Petersburg	John O'Brien	J. J. Martin	Richmond. Va.
Richmond & York River	C. H. Harris	J. L. Thompson	Richmond. Va.
Rome, Watertown & Ogdensburg	Wm. Jackson	H. H. Sessions	Rome. N. Y.
Reading & Columbia	B. Van Lew		Columbia, Pa.
Rome, Georgia	O. W. Harbin	O. W. Harbin	Rome. Ga.
Rochester & Genesee Valley	M. E. Brown	M. Wilder	Buffalo, N. Y.
Rockford, Rock Island & St. Louis	Joseph Elder	J. F. Nolte	Beardstown, Ill.
Rutland	N. L. Davis	Frank Sessious	Rutland, Vt.
S			
San Francisco & San José	R. B. Bishop	Frank Bellisle	San Francisco, Cal.
St. Croix & Lake Superior			New-York City.
St. Croix & Penobscot	Edward Bolton	A G. Page	Milltown, Me.
St. Lawrence & Ottawa	Calvin Dame	Calvin Dame	Prescott, Canada.
St. Louis & Iron Mountain	O. A. Haines	Oscar Doolittle	Carondelet, Mo.
St. Joseph & Denver City	E. Sleppy		Elwood, Kan.
San Antonio & Mexican Gulf	W. T. Bingham		Victoria, Texas.
South Side of Long Island	A. P. Doane	M. Heitzman	Williamsburg, L. I.
St. Paul & Sioux City	Jas. G. Butterfield		Shakopee, Minn.
St. Louis, Vandalia, T. Haute & Ind.	C. R. Peddle	H. Kirmse	Terre Haute, Ind.
South-Carolina	W. B. Smith	John Reed	Charleston, S. C.
South & North-Alabama	Tho. Jeffries	Tho. Jeffries	Lime Station, Ala.
Southern Central	Chas. G. Brown	H. Mooney	Auburn, N. Y.
Southern Minnesota	Wm. Lininger		Wells, Minn.
Southern of Canada	Albert Congdon	Albert Congdon	Fort Erie.
South-Western of Georgia	C. D. Wall		Columbus, Ga.
South-Western of Georgia	D. M.Gogul	James A. Knight	Macon, Ga.
South Shore	Warren E. Ray		Cohasset, Mass.
Stanstead, Shefford & Chambly	W. H. Smith	M. Sessions	Waterloo, C. E.
Schuylkill & Susquehanna	John E. Wootten	John E. Wootten	Reading, Pa.
Seaboard & Roanoke	J. B. Pendleton	J. B. Pendleton	Portsmouth, Va.
Stonington & Providence	J. H. Anderson	J. H. Anderson	Providence, R. I.
Selma & Gulf	Wm. T. Daughtrey		Selma, Ala.
Selma, Rome & Dalton	A. G. Maynes	W W. Peirce	Selma, Ala.
Sioux City & Pacific	Charles Foster	J. R. Dow.	Missouri Val., Iowa.
Spartanburg & Union	J. N. Benner	Jacob Rice	Union C. H., S. C.
Sheboygan & Fond du Lac	— Patterson		Sheboygan, Wis.
Sullivan & Erie			Tonawanda, Pa.
Syracuse & Binghamton, N. Y.	B. G. Merrill.	B. G. Merrill	Syracuse, N. Y.
Sycamore & Cortland			Sycamore, Ill.
St. Louis & South-Eastern	L. B. Salisbury		Mt. Vernon, Ill.
Nashville Division	H. M. Smith		Nashville, Tenn.
St. Louis, Kansas City & Northern	John E. Calhoun	C. S. Buck	St. Louis, Mo.
T			
Taunton Branch.			Taunton, Mass.
Tioga	Peres Bonny	D. H. Stratton	Blossburg, Pa
Texas & New-Orleans	R. B. Baer		Houston, Texas.
Tennessee & Pacific	William McKeand	William McKeand	Nashville, Tenn.
Toledo, Wabash & Western	W. F. Ray		Fort Wayne, Ind.
Toledo, Wabash & Western		David Hoit	Toledo. Ohio.
	T. G. Gorman		Springfield, Ill.
Toledo, Peoria & Warsaw	A. H. De Clerq	R. M. Hemphill	Peoria, Ill.
Troy & Boston	Foster Church	R. V. Coon	Troy, N. Y.
Toronto, Grey & Bruce			Toronto, Can.
U			
Union Pacific	I. H. Congdon	Geo. E. Stevens	Omaha, Nebraska.
Utica & Black River	Wm. E. Granger	David James	Utica, N. Y.
Utica, Chenango & Susquehanna	C. H. Brown		Utica, N. Y.
V			
Vicksburg & Meridian	Jas. B. Brown		Vicksburg, Miss.
Vineland			Vineland, N. J.
Vermont Central	J. M. Foss	Milton Sessions	St. Albans, Vt.
Vermont & Massachusetts	D. T. Davis	Jacob Marsh	Fitchburg, Mass.
W			
Wicomico & Pocomoke			Berlin, Md.
Wilmington, Charlotte & Rutherford	W. A. Gill	Thomas Myers	Laurenburg, N. C.
Wilmington, Columbia & Augusta	George Hall	W. J. Calais	Wilmington, N. C.
Westchester & Philadelphia	John Moyer	N. Pawling	Philadelphia. Pa.
Wilmington & Weldon	John Bissit	John Bissit	Wilmington, N. C.
Wilmington & Western			Wilmington, Del.
West-Jersey	W. McAllister	C. C. Williams	Camden, N. J.
Western Maryland	R. V. Dohoney	J. H. Nussear	Union Bridge, Md.
Winona & St. Peter	F. C. Ford	H. L. Preston	Winona, Minn.
Western North-Carolina	E. H. Marsh	E. H. Marsh	Salisbury, N. C.
Western R. R. N. C	M. W. Atkinson	M. W. Atkinson	Fayetteville, N. C.
West-Feliciana	R. C. Brower		Woodville, Miss.
Western & Atlantic	John H. Flynn	John Sherman	Atlanta, Ga.
Worcester & Nashua	George H Griggs	George H. Griggs	Worcester, Mass.
Welland	William Wells	William Pay	St. Catharine, C. W.
Washington & Ohio	Nathaniel Hayes	Joshua Harrison	Alexandria, Va.

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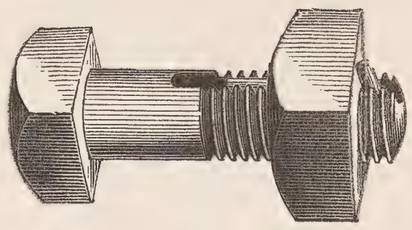
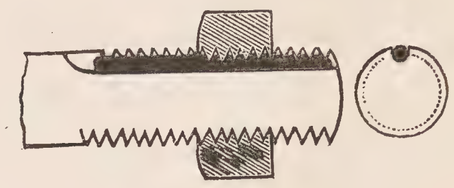


"Cumming Nut-lock,"
Patented
June 16, 1868,
August 23, 1870.



SECTIONS.

Unequaled for CHEAPNESS, SIMPLICITY & EFFECTIVENESS.

This simple device, as will be seen by the engravings, consists of a groove being cut in the threaded part of a screw bolt into which is placed a key of copper wire, or other soft metal; when the nut is screwed on, it cuts a thread on the key, thereby making it impossible for the key to get out until the nut is taken off. When the nut is screwed up to its place, that part of the key over which the nut has passed is riveted up against the nut with a small punch, destroying the thread on the key. The nut, therefore, can not move backward until force is used, as with a wrench.

The groove can be rapidly cut with a simple machine designed for the purpose.

Experience has proved this device absolutely reliable, and it is the cheapest of all known devices for the purpose. By its use, old bolts on which the nuts have become too slack for use can be made as good as new, making it a great saving to railroad companies and others in that item alone. It is cheaper than a check-nut.

If the bolt should become slack from shrinking of timber or other causes, *the nut will always remain firmly attached to the bolt*, and, with the wrench, can be screwed up *any distance*, and the wire riveted up any number of times, or can be taken off without injury to the nut or bolt.

This is the only method in use that locks the nut firmly to the bolt without regard to place or surroundings, all others require some attachment that holds the bolt in its position, and a washer or other attachment to keep the nut from turning.

Directions for Use.—Place the copper key in the slot, pointed end out, and beveled side up, in such a position that when the nut is screwed to its place about three-eighths of an inch of the key will project beyond its outer face. Then screw the nut to its place *over the key*, allowing it to cut its own thread in the copper. Then take a narrow flat set punch, and rivet the projecting part of the key *solidly* against the outer face of the nut. To tighten the nut: screw it up, and rivet the key tighter. To remove the nut: simply apply the wrench and unscrew the nut. It will cut its own way out through the copper. The same key can be used several times, by moving it outward a few threads in the slot.

Corns! Corns! Corns!

Bunions, Bad Nails, Joints, Warts, Wens, and all Diseases of the Feet cured without Pain by

DR. RICE, Surgeon Chiropodist,

and his Assistants, at New-York Chiropedal Institute,

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J. R. DENMAN,

MANUFACTURER OF

BENT OR CURVED GLASS,

ORNAMENTAL CUT GLASS, ETC.,

FOR RAILROAD CARS,

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LUBRICATING OIL.

WEST-VIRGINIA

Oil and Oil Land Co.,

PRODUCERS AND DEALERS IN PURE

West-Virginia Lubricating Oils,

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GLOBE NATURAL LUBRICATING OIL.

719 North Main St., St. Louis.

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Number One Black Varnish,

(For Smoke-Stacks.)

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Permanent Wood Filling, Dark,

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(For Surfacing.)

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A SPECIALTY.

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(A Two-Day Rubbing.)

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(A Four-Day Rubbing.)

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Permanent Wood Filling, Light,

(For Priming Light-Colored Work.)

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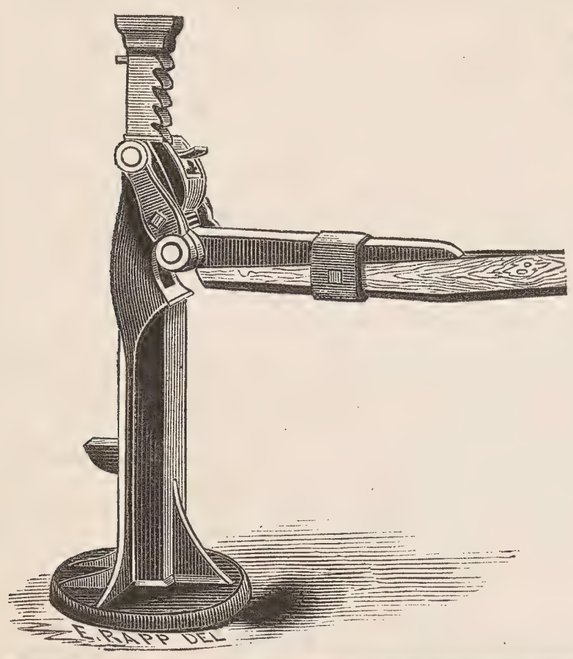
Railway Body Varnish,

(For Finishing Outside.)



Leffel's Patent Lever Jack.

Patented Dec. 10, 1850; Patented Nov. 15, 1864; Renewed Nov. 28, 1864.

ADAPTED TO ALL KINDS OF LIFTING,

BUT ESPECIALLY TO

BRIDGE AND RAILROAD WORK.

Nearly all the Railroads in the United States have these Jacks in use, and the testimony in every instance shows a very great economy in

LABOR, TIME, AND EXPENSE.

Orders solicited and promptly filled. Address,

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Springfield, Ohio, and
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Car Head Lining

DECORATORS,

ALL STYLES AND PRICES,

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Railway Car Springs.

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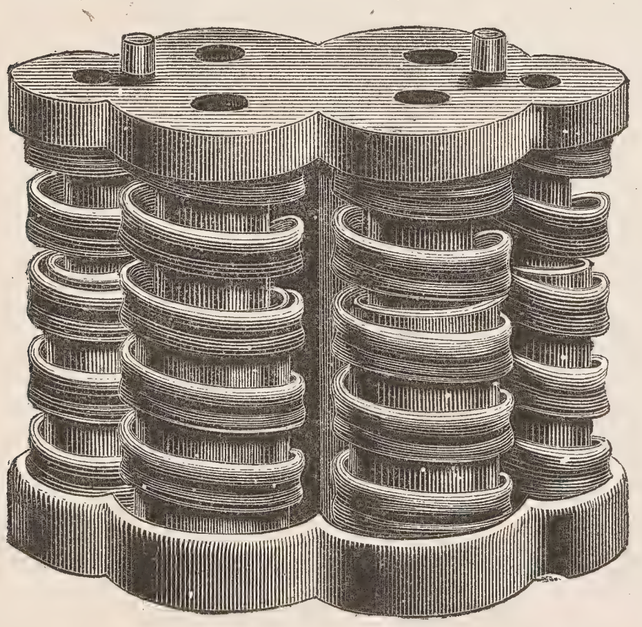
713 North Second Street, St. Louis.

RUBBER AND SPIRAL CLUSTER SPRING.



This Spring combines the materials of steel and rubber in a manner specially adapted to freight work and iron-truck bolsters. Four of them are sufficient for the equipment of a car.

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All who have any thing to sell to Railways or Car-Builders, for Machine Shops, Car Shops, Locomotive Shops, as they are sent free into all these shops. Subscription, $1. Address,

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Manufacturer of

ENGINE LATHES,

And other Machinists' Tools,

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Locomotives and Cars for Sale.

NEW LOCOMOTIVES OF BEST BUILD, SECOND-HAND LOCOMOTIVES.

Various gauges, 10 to 40 Tons, now running and in good order.

NEW AND SECOND-HAND PASSENGER AND FREICHT CARS,

BY

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GENERAL RAILWAY BUSINESS.

Pig and Scrap Iron, Old and New Rails, etc.
Contract for Steel and Iron Rails, Locomotives, Cars, etc.

Negotiate Railway Loans and Securities.

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POST & KALKMAN,

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MANUFACTURERS OF

Denison's Patent Cooling and Lubricating Compound,

FOR COOLING HOT JOURNALS.

It will immediately cool a *hot journal* while the cars are in motion, and no journal will heat where the box is packed with it.

And Dealers in Machinists' and Railroad Supplies.

Prescott's Patent Safety Valve.

W. B. POST. C. J. POST. C. W. KALKMAN.

FELTON, RAU & SIBLEY,

Varnish and Paint Manufacturers,

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Sole Manufacturers of

J. W. TULLY'S

Improved Paint Filling.

Patented February 8th, 1870.

A COMPOSITION OR FILLING FOR

Cars, Engines, Locomotives, Tenders, Coaches, Carriages, Steamboats, Safes, Piano Plates, Tools, Machinery, etc., etc.

This article possesses, unquestionably, superior advantages over all other Fillers now in use, from the following considerations—namely: Its elasticity is such that it will not peel, crack, nor blister. It possesses great durability, and is unequaled for hardness of surface and smoothness of texture, consequently it presents a beautiful groundwork for the reception of colors. It is a quick, firm dryer—two coats can readily be applied in a day—where great dispatch is necessary three coats may be put on in the same time. It is an *easy* rubber, saving fully one half the time usually employed in that heretofore unpleasant work—the part of painting which has been the most tedious of all, but now rendered easy, rapid and pleasant by the use of the improved Paint Filling. Its composition is such that the pores of the Pumice or rubbing stone are kept perfectly free and open during the entire process of rubbing, while other Fillers have a tendency to choke or fill up the pores of the stones, and thus render them useless or ineffective until cleaned or scraped off, which process is both slow and troublesome. It is therefore apparent that by the adoption of this article both labor and material would be economized. It comes in the form of a stiff Paste, *finely* ground, and when reduced to its proper consistency by the addition of Spirits Turpentine, 1 gallon will be equal to 1½ gallons of other Fillers, thus rendering it comparatively the cheapest article of the kind in the market.

From the many flattering testimonials received by the Patentee from the parties now using it a few only can be appended.

TESTIMONIALS.

MAUCH CHUNK, Pa., Sept. 26, 1870.

The article known as TULLY'S PATENT PAINT FILLER has been used for upward of three years by this Company, on Cars, Engines, Cabs, Wheels, Tenders, etc., etc., and find it an excellent substance for preparing fine surfaces, reducing the time usually spent in rubbing down one third. Wearing well, and with a fair trial, it will prove all that is claimed for it where introduced and placed before the public, as the best result of many years' experience obtained by a thoroughly practical Painter.

A. MITCHELL, *Master Mechanic,*
L. & M. Division of L. V. R. R.

We fully concur in the above.

JAMES I. BLAKESLEE, *Sup't of*
L. & M. Division of Lehigh Valley Railroad.
A. G. BROADHEAD, JR., *Sup't*
Beaver Meadow Div. L. V. R. R.
PHILIP HOFECK, *M. M., B M. Div.*
JOHN I. KINSEY, *M. M., L. V. R. R.*
DAVID CLARK, *M. M., Hazleton Div.*

Having full confidence in the men whose signatures are attached hereto, I endorse all they say, and confidently recommend Mr. TULLY'S PATENT PAINE FILLER to all in want of an article of the kind.

ROBERT SAYRE, *Sup't and Eng'r,*
Lehigh Valley Railroad.

N. B.—In addition to the "*PATENT PAINT FILLING,*" we manufacture a *Superior Belgian Varnish Filler,* designed to fill the grain of Hard and Fancy Woods used in the construction of Passsenger and Sleeping Cars. By its use from *Two to Three* Coats of Varnish are saved. Also, a *Scraping Filler* for Cars, Locomotives, Cabs, etc., to be *used where great dispatch is required.*

PRICES FOR

Patent Paint Filling,	$3 per gallon, in cans from 1 to 5 galls. Bbls. 10 per ct. less.
Superior Belgian Varnish Filler,	
Scraping Filler,	

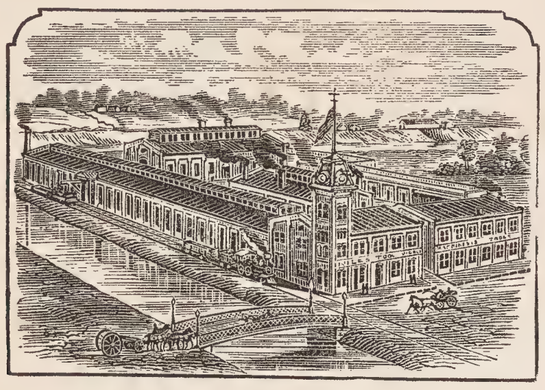
Directions for use accompany each package.

J. W. TULLY, Patentee and Gen. Agent.

ORDERS SHOULD BE ADDRESSED TO

FELTON, RAU & SIBLEY.

Machinists' Tools of Every Description.



We would call the attention of Railroad Companies and Car Builders to the superior excellence of our

Car Axle Lathes, (Gray's Patent,)
Car Wheel Borers,
Hydrostatic Wheel Presses, etc.

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PATENT ELASTIC FELT

For Car Seats, Mattresses, and Pillows.

ERIE AND ATLANTIC SLEEPING COACH CO.,
General Offices, 309 West 23d Street,
NEW-YORK, March 26, 1872.

F. W. BLOODGOOD, Esq., *President Patent Elastic Felt Co.*
P. O. Box 129, Jersey City, N. J.:

DEAR SIR: Press of business and absence from the city has prevented me from saying to you earlier, that our experiment the past year, in using your Patent Elastic Felt for Pillows and Mattresses, in the coaches of this Company, has proved entirely satisfactory, and that I now regard it as decidedly preferable to hair and feathers. It does not pack like hair, is soft, durable, and withal cheaper.

Respectfully yours,
WM. R. BARR, President.

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PATENT ELASTIC FELT CO.,

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Artificial Wood Ornaments.

We invite the attention of the trade, including

Furniture Manufacturers, Builders, Interior Decorators, Stair Builders, CAR BUILDERS, Architects, Steamboat Builders, Organ Manufacturers, and others,

To our variety of styles of ornaments, made to match black walnut in color, and which are perfectly fitted for use where not exposed to the weather. They have been sold extensively for several years, and have given entire satisfaction—so that all who have once used them have become constant consumers. They are artistic in design and unequaled in execution, being the production of the best artists, carvers, die sinkers, and moulders.

These ornaments hold glue and screws as well as carvings. They do not warp or crack. They are unaffected by changes of temperature, and withstand dampness as well as furniture. They will polish in every respect equal to wood, either with shellac, oil, wax, or varnish, and with less trouble, as there is no open grain to fill. They will gild or bronze beautifully by simply sizing, without any other preparation.

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For Lathes, Planers, Drills, Shaping Machines, Friction Clutch Pulleys, Gun and Sewing-Machine machinery of excellent designs and unexceptionable workmanship. Address,

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Also Silver-Plating and Bronzing.

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GREAT SAVING IN OIL!

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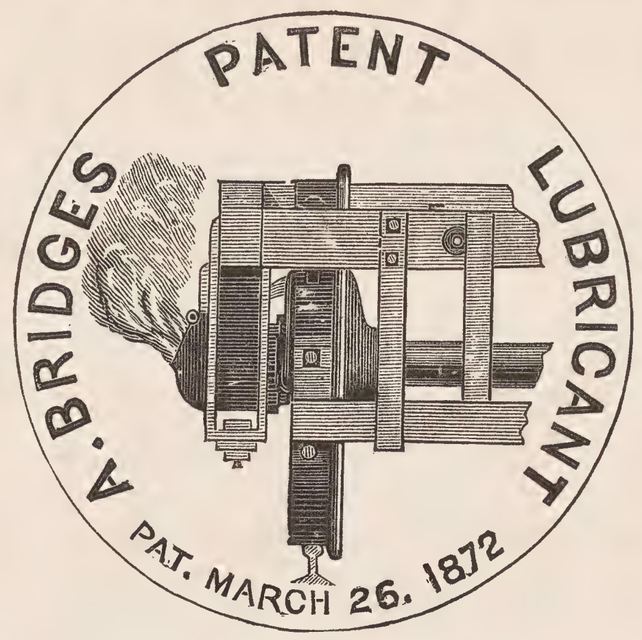

For Railroad Car Journals and other Bearings.

In presenting this Lubricant to the notice of Railroad and Steamboat Managers and Operators in Machinery generally, I do so with a practical knowledge of its merits, and with confidence that it will be found to possess invaluable qualities as a

Lubricator and Counteractor of Friction.

It has been in use, during the past two years, on a number of Railroads and Steamers, and is highly approved of.

Parties wishing to make a practical test of the Lubricant will be furnished with sample on application.

ALBERT BRIDGES, Patentee,

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Brilliant Railroad Car Lamp, WITHOUT KEROSENE.

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ABOUT LIGHTING PASSENGER CARS.

A Law has passed the Massachusetts Legislature (May 29, 1872) prohibiting the use of oil below 300° fire test, instead of 110° as heretofore. The

Mineral Sperm Oil

meets the requirements of this law. It is now used by **all the Roads leading from Boston,** and by many other Roads, and by a large number of **Pullman's Palace Cars,** in the place of kerosene or candles.

THE LIGHT IS EQUAL TO KEROSENE

and the expense not half that of candles.

To use this oil in our common car lamps, now in use in all parts of the country, it is only necessary to **Change the Burner,** (costing about 50 cents per lamp.) For new lamps, in place of candles, send for lithograph and price-list. This oil is 55 cents per gallon in Boston, New-York, Pennsylvania, etc.

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Pure Raw and Boiled Linseed Oil, White Leads and Zincs, Colors, Putty, Varnishes, Japans, etc.

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so long used and so highly recommended as the cheapest and best covering for all outside work ever offered. The CAR COLOR are all ground in Pure Boiled Linseed Oil, and packed in all sized kegs and barrels.

Samples of all the Colors, with Price-List, will be furnished on application.

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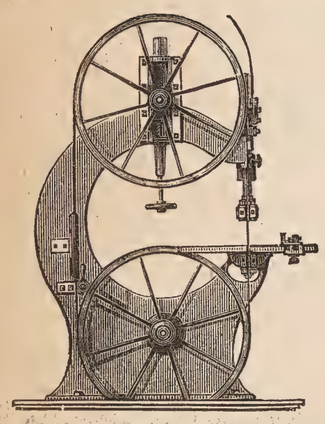
Railway-Car Building, Ship-Building, and Band Sawing.



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ANY LENGTH AND WIDTH.

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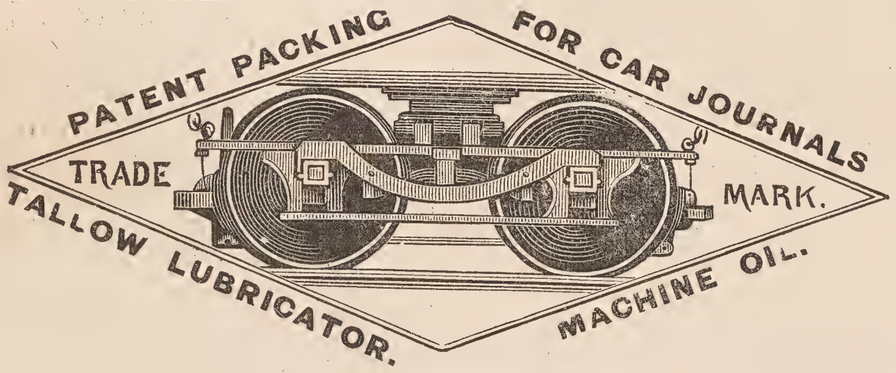
To prevent mistakes and consequent injury, I recommend to all parties to whom such materials are offered to examine first whether the packages have this Trade-Mark:



PATENTED FEBRUARY 27, 1872.

Parties using these materials recognize the necessity of this caution.

A large number of railway officials who have tested and used this packing, call it

THE MOST RELIABLE PREVENTIVE OF HOT JOURNALS.

Orders for sample packages are promptly filled.

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Bohannan's Patent Brass Railroad Car and Switch Locks,

WITH SPRING DROP AND CHAIN.

Of most beautiful finish and action, and said to be superior in every respect to any Railroad Lock offered in this country. Samples and Price-list at the

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All orders by mail or otherwise will receive prompt attention. In ordering by mail when a Special Key is required, a "Sample Key" inclosed in a letter is all that is requisite.

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Winslow Iron Car Roof.

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☞ Over 33,000 cars now in service covered with this roof. It will last, without repairing, as long as the car it covers, and is more economical by one half than any roof in use. Furnished either of Galvanized Iron or painted with Metallic Paint.

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The undersigned having purchased the Manufactory of MR. GEORGE HOLT, (nineteen years established,) together with the entire STOCK, TOOLS, BLOCKS, and other appurtenances, beg to invite your attention to their SUPERIOR FACILITIES for furnishing

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Of the most approved Styles and Patterns,

Either Full Decorated, Part Decorated, Encaustic or Printed, and Plain, at short notice, and in the most satisfactory manner, at Moderate Prices.

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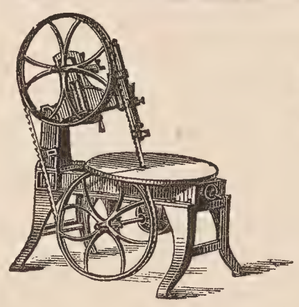

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Nos. 461, 463 & 465 West 40th St.,
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Patent Improved Band Saw Machines,

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All kinds of MOULDING and SAW MILL MACHINERY.

Adjustable Double Spindle Boring and Mortising Machines, Wood and Oval TURNING LATHES, Shafting, Pulleys, Hangers, etc.

ALL KINDS OF MACHINE WORK MADE TO ORDER.

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Machine Company,

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Manufacture all kinds of Machinists' and Car Builders' Tools, for working Iron, such as Lathes, Planers, Sloting Machines, Horizontal Drilling and Boring Machines, Vertical Drills, all sizes, Shaping Machines, Bolt Cutters, Nut Tappers, Car Wheel Borers, Hydraulic Wheel Press, Axle Lathes, etc. Patent Sectional Tubular Boiler, safety and great economy at moderate cost.

Also Oil Tank Cars, Boiler and Sheet Iron Work of all kinds, Foundry Cupolas, Cranes, Ladles, etc.

SAMUEL FISKE,
General Manager.

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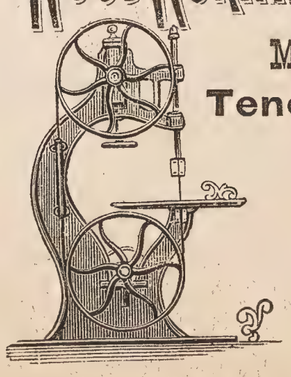

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Band Saws, Scroll Saws,

PLANING AND MATCHING

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For Railroad, Car and Apricultural Shops. Superior to any in use.

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Only Selling Agents for the "**GLOBE**" Brand and other pure **WEST VIRGINIA LUBRICATING OILS**, specially adapted for Railroads and Machinery purposes.

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We have just received a choice assortment of

French Black-Walnut, Amboine, Thuya and Hungarian Ash Veneers; also, a small lot of California Laurel, Red Wood, and Red Wood Burl.

The above, with our usual attractive stock of Veneers and Hard-Wood Boards in Mahogany, Walnut, Cedar, etc., are offered to the attention of

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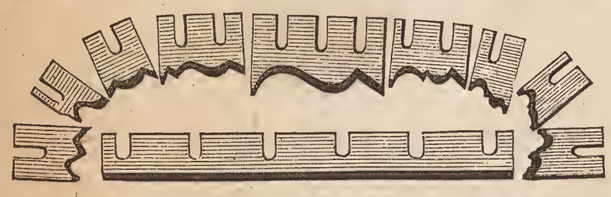

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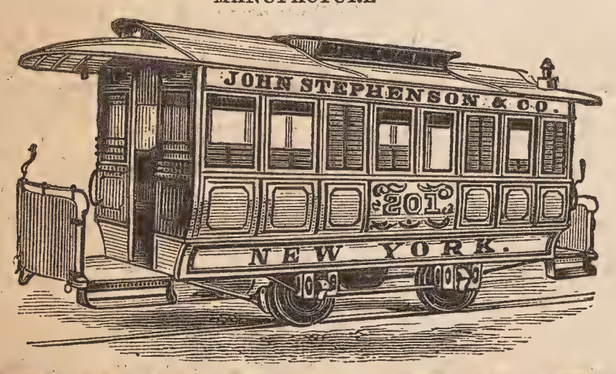

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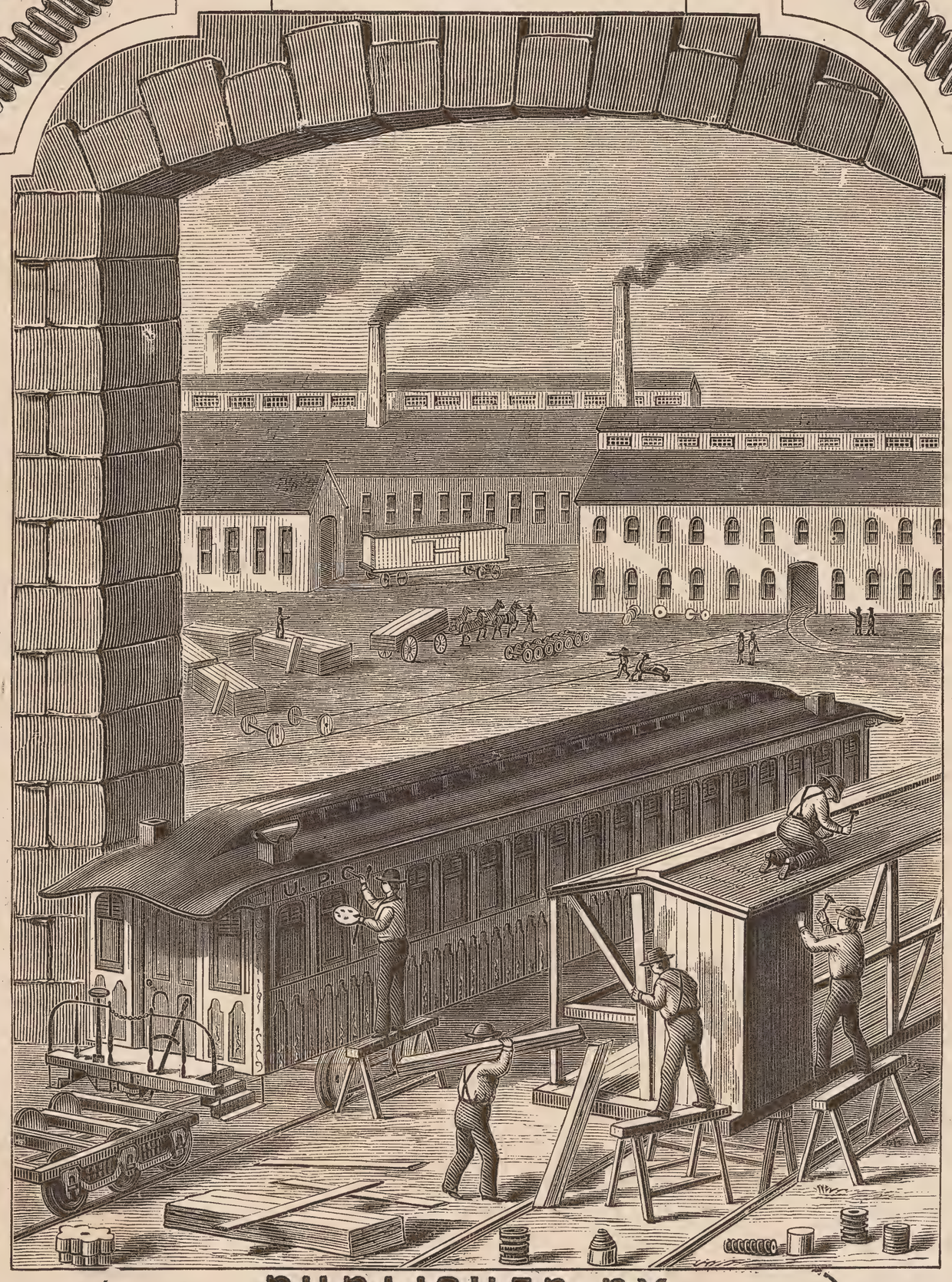

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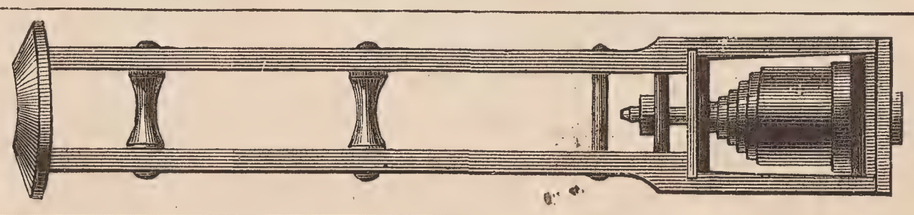

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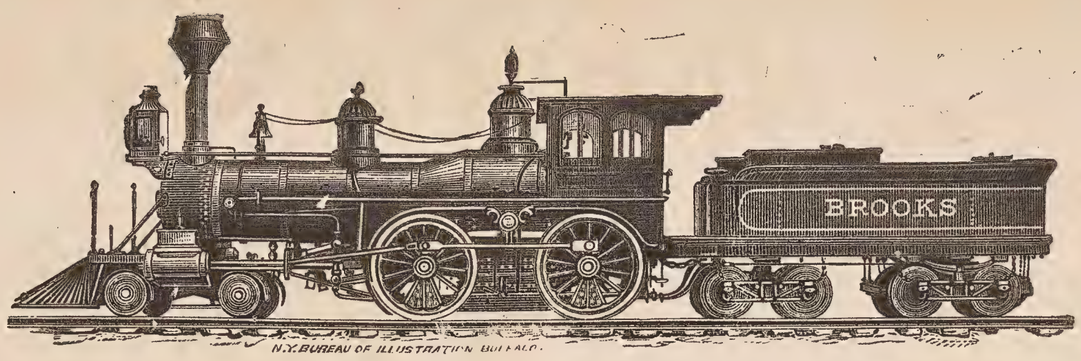

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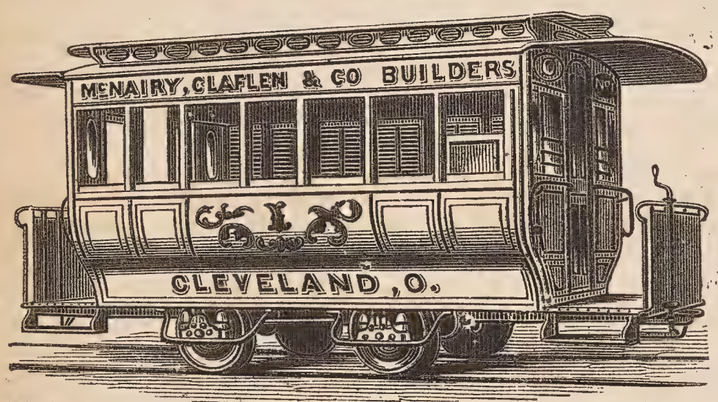

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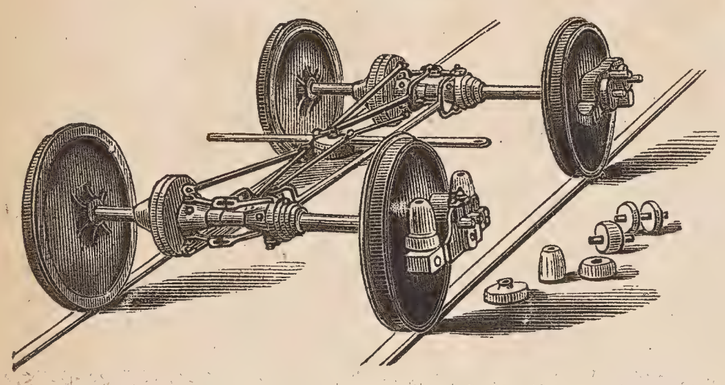

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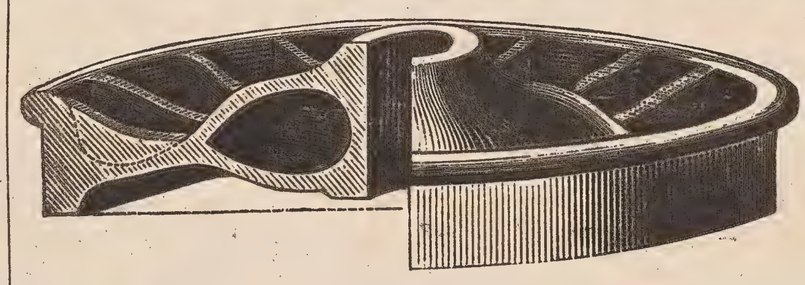

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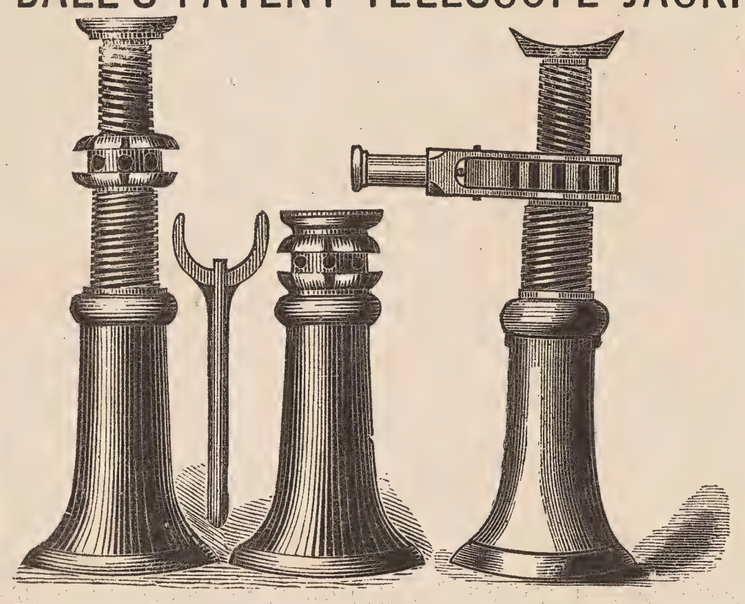

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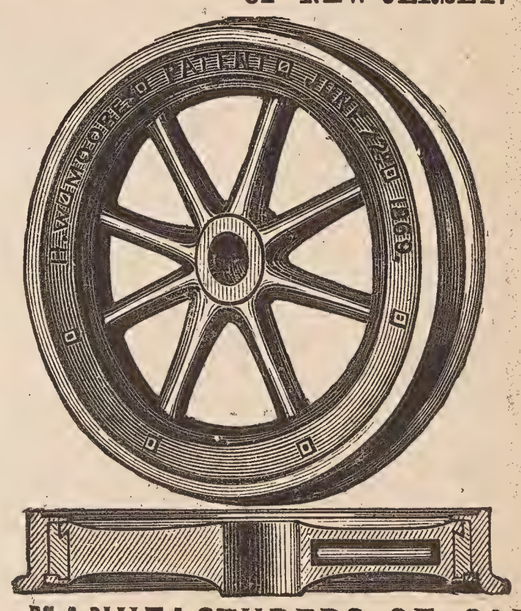

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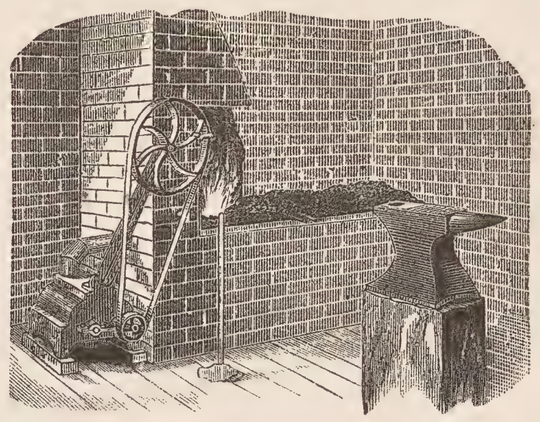

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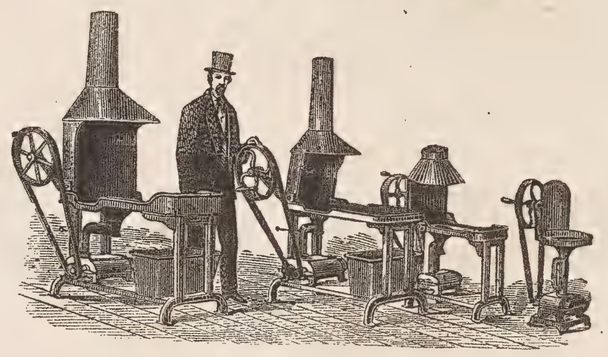

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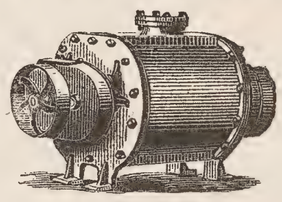
OF ALL  SIZES,

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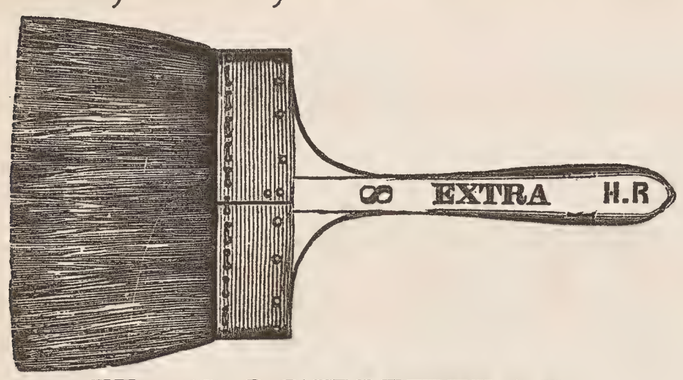

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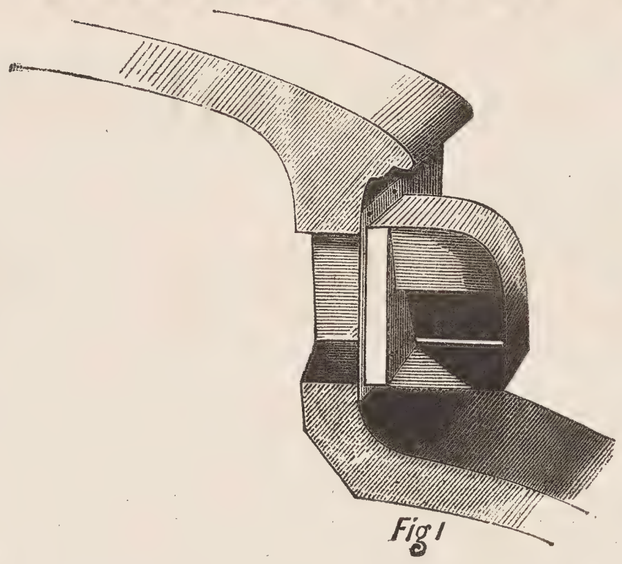
Fig 1

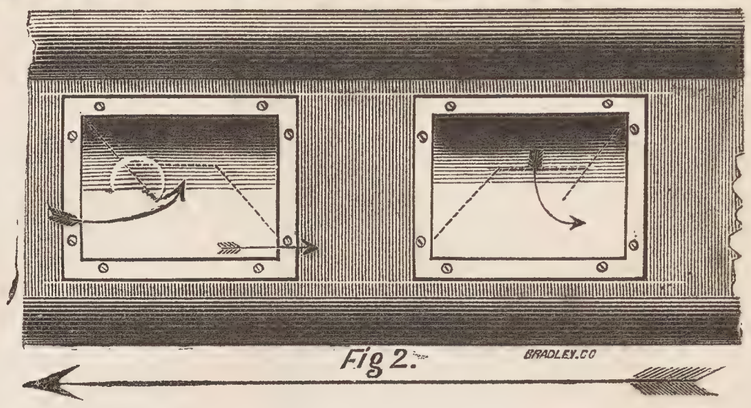

Fig 2.

THE Ventilators are placed as usual in the car roof as shown in Fig. 1, their mouths facing alternately in opposite directions, those facing forward admitting the air, and those facing backward affording an exit. Fig. 2 represents a side section of the raised roof with two of the ventilators alternately arranged. When the car is moving in the direction indicated by the arrow, it will be seen, by the curved darts, that there is an ingress and egress of air constantly taking place. The operation of the ventilators is reversed with precisely the same effect, when the car moves in the opposite direction. The internal structure is such that the dust and cinders passing into the mouth of the ventilator are intercepted by striking against two shields, shown in Fig. 1, and indicated by dotted lines in Fig. 2, and are thus naturally thrown to the bottom, where they are carried out through a small opening as shown in Fig. 1, and by the straight dart in Fig. 2, a current of pure air being forced into the car at the same time through a lateral opening. The faster the car moves, the greater is the quantity of air admitted and expelled, thus securing a free circulation which does not subject the occupants to a direct current or draught. The ventilator is also noiseless in its operation. There is no clattering of valves, and no change is necessary when the car reaches its destination. Once put in place, it is always in readiness, and runs itself independent of all employees.

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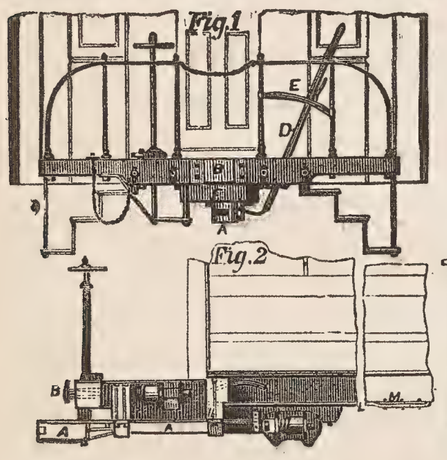
Fig.1

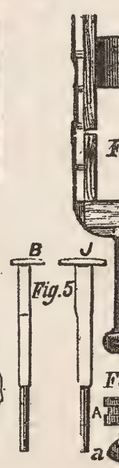
Fig.2

Fig.5

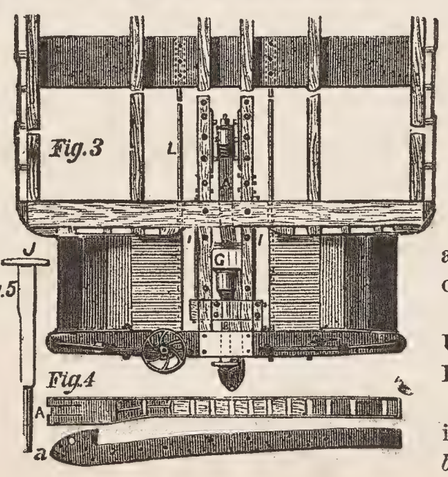
Fig.3

Fig.4

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DESCRIPTION.

Figure 1 is an elevation; Figure 2, a longitudinal section; Figure 3, a plan of an end of a car to which the arrangement has been applied; and Figures 4 and 5 show top and side views of the "Hook" and "Buffer," drawn on a larger scale than that of Figures 1, 2, and 3.

The letters refer to the same parts in all the figures. A is the coupling "Hook," B the "Buffer," C the "Stop," D the "Lever," E the "Quadrant Ratchet," F the "Truss Beam," G the "Spring Beam," H the "Suspender Beam," I the "Upward Trusses," K the "Main Spring," L the "Downward Trusses," and M the "Bolster."

The Platforms, instead of being located below the centre line of the main sills of the cars, are placed *in* that ine, and held there by the Trusses I and L, so that the point of contact (in Buffers B) is *in* the said centre line and *not below* it.

The coupling "Hook" A is attached to the draw spring the same as the ordinary draw head, and at the same height above the track, but in such a manner that the outer end is free to move laterally for a short distance. The Coupling Hook projects beyond the platform. The Stop C is placed under the Buffer Beam to prevent accidental uncoupling. When two cars are brought together, the Coupling Hooks, from *their shape*, push each other aside, until the Buffers B are compressed hard on the Buffer Springs, then—*the points of the hooks having passed each other sufficiently far*—the Hooks are carried forward by their main-springs, and thus the "*Coupling*" and "*Compression*" are both effected automatically *and at the same time*, and without the use of links and pins. When two cars are thus coupled together, the *head* of the *Hook* of each car is under the Buffer Beam of its opposite car, and the platforms are close together, (about 4 inches apart.) The effect of this is, *one platform can not be forced over the other*, nor can a *child* fall between the platforms; the dust and rain are nearly all shut out; the "Compression" makes the train run steadily, and prevents all jerking at starting and stopping.

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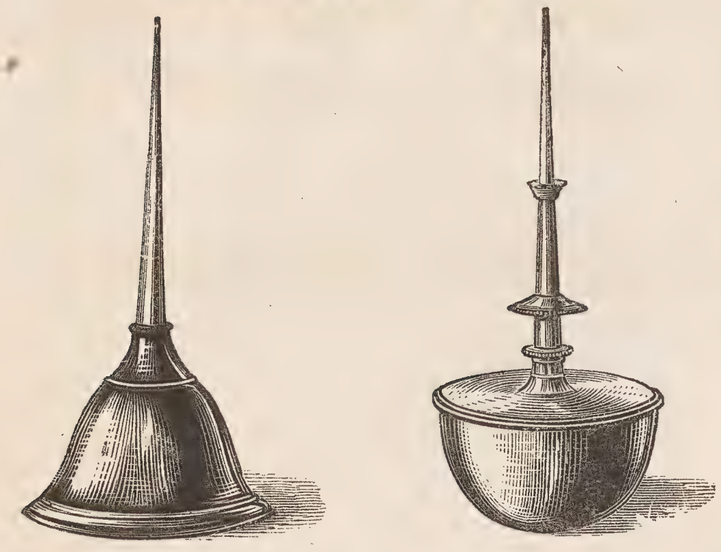

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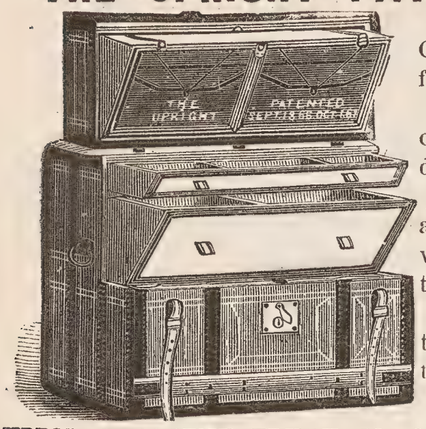

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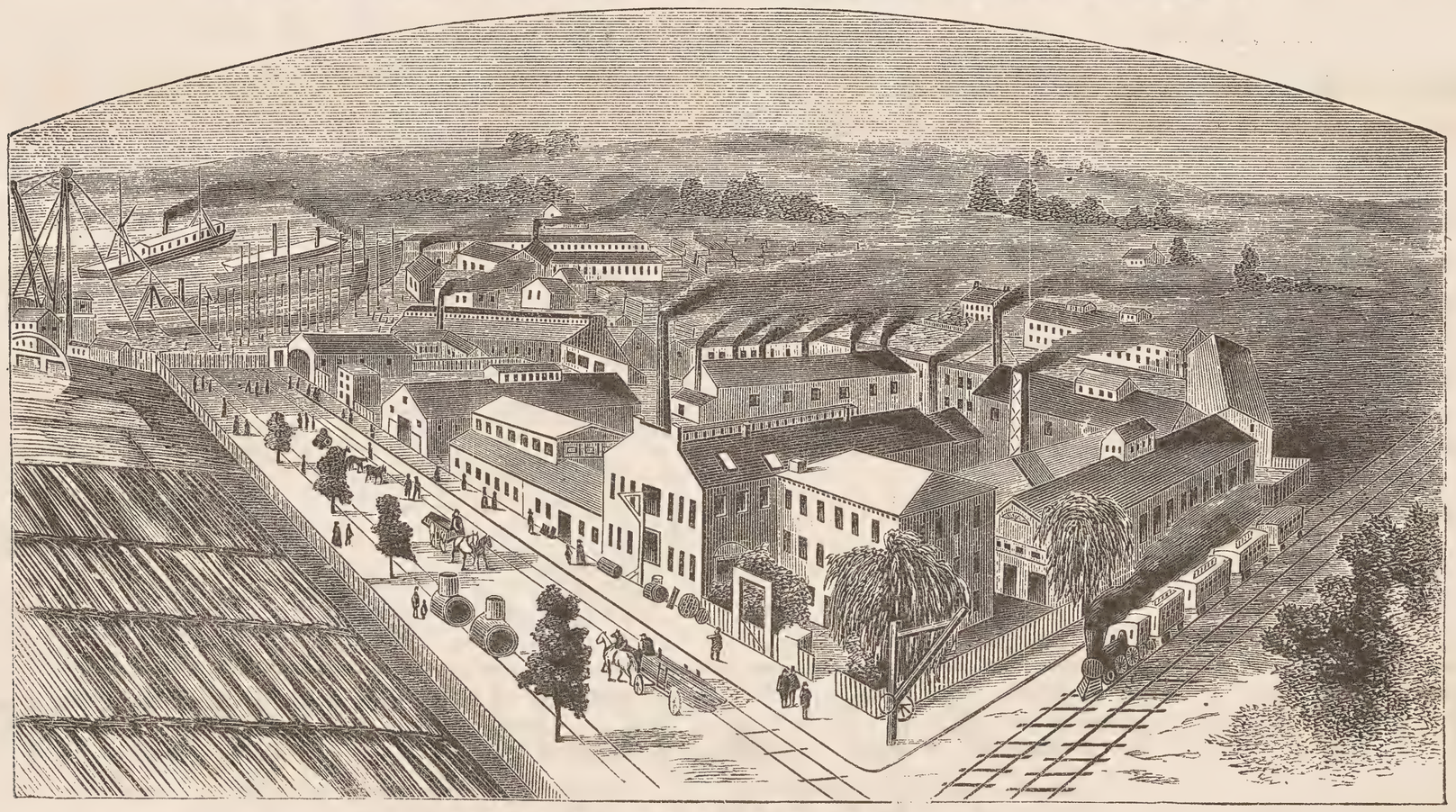

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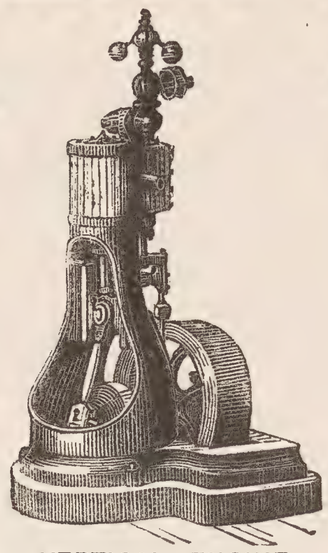

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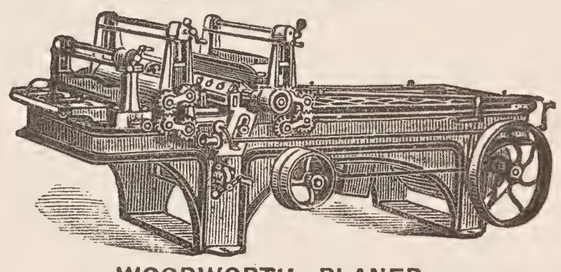

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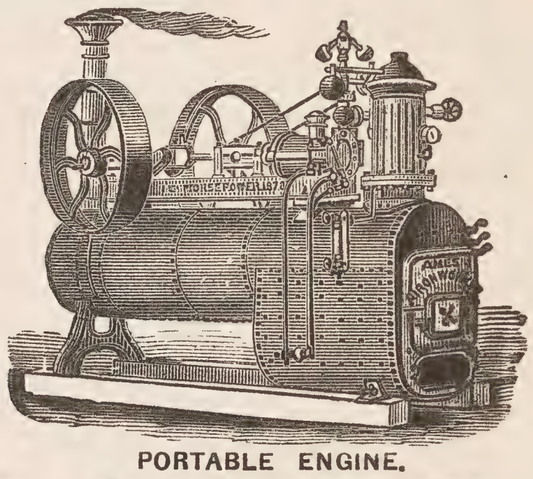

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THE NATIONAL CAR BUILDER.

DEVOTED TO THE INTERESTS OF RAILWAY ROLLING STOCK.

Vol. IV.
No. 2.

FEBRUARY, 1873.

One Dollar per Annum
Single Copies, 10 Cents.

The Car-Shops of the Central Pacific Railroad of California.

THE Sacramento *Record* contains a description of these shops, which are under the general supervision of Mr. Benjamin Welsh, the master car-builder, who is a veteran in the service of the road, having been connected with it from its commencement. His long experience and intimate knowledge of the mechanical details pertaining to this department eminently fit him for the responsible position he holds.

The main shop is 90 x 230 feet, and two stories in height. The first floor is devoted to machinery and framing purposes. Here may be found all the machinery for the working of wood that can be found in any car-shop in the United States, and one machine which no other shop in the world has. It is called a tenoning and gaining machine. All centre-sills for construction or repairs of cars are framed by this machine, and it will turn out 400 centre-sills every ten hours, and this, too, with the labor of two men. It was designed and built at these shops, and is acknowledged by all car-builders to be a wonderful piece of mechanism.

The second floor is divided into three compartments, the cabinet-shop, where may be found machinery for doing the finer wood-work, such as band-saws, boring machines, and among the rest a machine called a variety machine, upon which can be made mouldings and carvings. Where solid panel-work is required, this machine is brought into use to great advantage. The finer work for sleeping and passenger-cars is done in this shop, such as the doors, windows, blinds, and all the inside finish, veneering, etc. The furniture for all the stations and offices along the road is also made here.

Twelve men are employed in the upholstery department in constructing new and repairing old seats trimmings, etc. The bed-linen for the sleeping-cars and steamers is made up in this room, and two of Singer's machines, run by power, are kept constantly at work. A machine for picking the hair that is used in such large quantities for the filling of cushions and backs may be seen here.

The capacity of the shops is six box freight-cars and six flat-cars per day, two passenger and one sleeping-car per month, besides the general repairs of the passenger-car stock. The building is of brick, with a pile and granite foundation, and has a truss roof covered with corrugated iron. To the right of the main shops stands the old car-shop, a temporary building of wood, which is used as a paint-shop for freight-cars; and adjoining this is the tin-shop.

The paint-shop is of brick, with a corrugated iron roof. The main building is 70 x 242, with five L's, each with a track running through from the main shop, where are painted and varnished all the passenger-car stock. These rooms are each separated from the main shop by close-fitting doors, giving always clean rooms with good light and perfectly free from dust, which causes so much trouble in finishing cars in a satisfactory manner.

The transfer-table has a double track with a pit 60 x 262. The house for drying lumber is heated by four-inch steam-pipes, and green lumber is run into it on small cars. The freight-car repair-shop is a wooden building, 36 x 430. The foundry is also of the same material. Preparations are being made for manufacturing car-wheels in sufficient quantity to supply the demands of the road. The blacksmith-shop has fifty forges and two furnaces. There is being constructed for this shop machinery for mending railroad bars that become so worn and battered at the ends as to be unsafe.

A large shaft for one of the bay steamers, 28 feet long by 12 inches in diameter, weighing 6 tons, was recently finished at this shop. It was entirely of scrap-iron, which had first been worked up into slabs, and then put together and worked into a shaft. It is the first job of the kind ever done here, and is considered by steamboat men to be as good a job as was ever done on the coast. The furnace is now at work in the construction of the frames of new locomotives, which are to be made of scrap. All the shafts for the locomotives will be made at the same place, and of the same material.

One large steam hammer and two large fires have done nothing for the past year but relay old car-axles. These axles becoming worn at the journals are too small for safety, and are here cut off, and new ends, manufactured from scrap, are welded on, which gives a much better axle than when new.

There is also a department for cleaning waste used on locomotives. It is sent here from all points on the road, and is made as good as new at a cost of less than five cents per pound, while the new costs as high as twenty cents. In the centre of the building is a machine which has ten stamps, worked and operated the same as the stamps of a quartz-mill. At the end of these are fixed large balls of rubber. The waste is first steamed and heated, then passed into a large tub or vat partially filled with hot water, into which the stamps work, which is closed up and the mill set to work. After the waste has been sufficiently pounded, it is put into other large vats, in the centre of which is fixed a set of rollers made of rubber. The waste is run back and forth through these rollers until it is entirely freed from dirt and grease, when it is put into another vat of clean hot water and passed through another siege of wringing, and is finally put to dry upon racks made for that purpose. When properly dried, it is made into bales ready to be shipped to any place where wanted. One thousand pounds of the dirtiest, greasiest waste can be cleaned per day, making a saving to the company of $150 per day in this item alone. The same waste is often washed the second time.

The locomotive department is also extensive and equipped with the best of machinery. The round-house contains 29 stalls.

Can Railroad Accidents be Avoided?

IN view of such accidents as that on the Cross-Cut Railroad it is well to ask if any plan can be devised to stop such wholesale destruction of life. And if a plan which promises well is suggested ought not public sentiment to force the railway companies into testing such device? An invention has been patented by Lewis D. Boyce and G. H. Jones, of this city, designed to avert the catastrophes caused by broken rails and misplaced switches. It was lately exhibited at the fair of the American Institute in New-York; the judges in their report indorse it by their unqualified approval, and a medal of special award has been voted to the inventors. The contrivance consists of cone wheels on a shaft between the shafts of the ordinary wheels of a car-truck. The cones are ordinarily clear of the track, but the moment a broken rail or misplaced switch throws off the ordinary wheels, the cones keep the truck from the ties, the car moves along the track, is not overturned, and the resultant damage is but slight. Such at least is the effect of the invention, as claimed by the inventors and as believed by many railroad men. We suggest that the companies try the device.—*Rochester Democrat.*

Practical Hints on Varnishing.

WE insist upon it, that every painter should have a tight varnish-room. Varnishing should always be done in a warm atmosphere, 72°, or as warm as you can comfortably work in. In a reduced atmosphere water is always present, an invisible dew, and will give to varnish a milky and clouded appearance; even on a fine summer day this may happen, and the only way to obviate the difficulty is to heat to 72°, sufficient to keep the moisture suspended in the air until the solvent has entirely evaporated, leaving the gums in a thin, glossy coat; the brilliancy and defensive value of the varnish will depend upon this. To produce a brilliant surface, have your work in the varnish-room a few hours before varnishing, that it may acquire the same temperature as the atmosphere. Smoothe the surface, wash off and wipe dry with a chamois-skin or piece of old silk, removing all traces of dust, moisture, or grease—no oil or grease should be allowed or used; have your brush as large as the nature of the work will admit—soft, clean, and free from loose hair. Lift the varnish lightly with the brush, charging moderately, and apply a thin coat. Begin at a little distance from the edge or at the inside of the panel, highest point first, and work to the outside edge in direct, long, rapid, and steady strokes with a moderate pressure, sparingly upon the edges and angles, working alternately toward the ends; spread evenly and quickly the thickness of paper, and draw lightly for finish; in this great care and watchfulness is required. After varnishing, expose your work to the heat of the sun or keep in heat free from dust and draught. Cold air and draught passing over varnish will dull the surface wherever they extend. If the varnish should

so become chilled, the brilliancy and clearness may be restored by giving the surface another thin coat, and immediately hold near the fire to dissolve the chilled coat, but not too near to blister. For brushes we would recommend such as may be obtained of our friend "Wheeler"—"extra oval taper, finest bristle," and "fine, soft, flat, and thick fitch, badger, or goat's hair brushes." Have them strong, close, and fast bound. If they are weak, spread, or divide, your varnish will not lay in a good body, and the work will be disfigured. After use keep them covered in varnish, not oil, and in a warm place. In a word, have a varnish-closet in which to keep your varnish-cans, pots, and brushes in a dry place, always closed. Oil varnishes drying more slowly than spirit varnishes, more time may be occupied in laying on the varnish, and larger surfaces are more easily and uniformly covered but have a clean varnish-room, good brushes, free from dust and loose hairs, and look out for a dry and warm atmosphere if you wish to produce a brilliant surface.—*Cabinet-Maker.*

Railway Passenger-Cars—The Advantages and Defects of their Construction.

BY J. M. BLANCHARD.

In discussing a subject of such magnitude and importance as the one to which this article refers, it is manifest that the mind should be divested of all prejudice, in order that the questions involved may be treated fairly and impartially; and, in passing the threshold of our essay, it is proper that two questions of primary importance should be answered, namely, For what are passenger-cars designed? and then follows another of no less importance, For what *should* they be designed? These questions will by some be deemed somewhat irrelevant, if not altogether impertinent, but if they can be fairly answered, we shall be the better prepared to arrive at a just appreciation of the existing plans of construction. First, then,

For what are passenger-cars designed?

They are designed primarily to serve as carriages for the transportation of persons; and secondarily to serve various other purposes, among which is such a construction as will bring to the corporation owning them the greatest amount of income on the money invested. In order that this result may be realized, some corporations deem it best that various kinds of costly material should be used in interior finishing and furnishing, and a very lavish expenditure made in ornamentation; while others hold that proper and comfortable seats, good ventilation, and suitable means for keeping the cars well warmed, are all the requisites that are essential. There are others, also, who seem to think that perfection has been reached if, upon entering a car, the eye of the patron of the road can rest upon an aggregation of brilliant colors, thrown together not unfrequently without much regard to the principles involved in the science of chromatics.

The proper answer to our second question, What should passenger-cars be designed for? would seem to be embodied in the two indispensable requisites—safety and comfort. It must be apparent to all persons who are in the habit of taking long journeys by rail that the most desirable thing is comfort, after being assured of as great a degree of safety as in the nature of the case is attainable; but this can not be secured by decorating the interior of the cars with rare and costly woods or the finest plush or carpets, although, perhaps, all these are desirable when used with discretion and subject to proper limitations.

Passenger-cars, then, should afford the maximum of comfort and safety; and this assertion leads to a consideration of the modes of construction having special reference to the production of these results. And first, how can passenger-cars be made safer? It is the opinion of the writer that there are many improvements needed, all of which would more or less contribute to the greater safety of the traveling public, and that too without any greatly increased expenditure by the railroad companies.

The first and perhaps most prolific source of danger is our car platforms, which are, as they are at present constructed, an appendage to the body of the car, of much lighter and consequently weaker material than that of which the body-flooring is made; and being placed in a much more exposed position, especially in cases of train collisions, are just the things to facilitate the process of "telescoping," as it is termed. It would hardly seem that an argument would be necessary to prove this, when it is remembered that two of these weak appendages are placed on each car, and two of them between each two cars of a train, and which are exactly adapted to give way in the event of a collision, and thus allow the acquired momentum of the car-body to force it through the space occupied by such portion, and into the next car. Now, if the strong timbers of which the frame of the car is made were permitted to extend far enough beyond the body to come in contact, or nearly so, with those of the next car, such telescoping would be at least less frequent, if not impossible. I am not unmindful of the advantages that accrue from the use of the platform as at present constructed, such as permitting the steps for ascending to them to be brought within the width of the car, and the attachment of the buffers; but I can not believe they compensate for the disastrous consequences which they favor.

Another source of danger is the practice, which prevails in many parts of the country, of allowing the cars to rest upon the trucks at a point, in many cases, outside of the wheels, by which arrangement a large surplus of weight is thrown upon the wheels on one side of the truck, this surplus being, for the time, taken from the wheels upon the opposite side of the same truck, and thus they are left in a condition to have their flanges raised above the rail, and allow the car to be thrown from the track in passing curves or irregularities in the surface or alignment of the rails. The remedy for this is centre-bearings on the trucks which shall receive the entire weight of the car, with side-supports to prevent the rocking or rolling motion of the bodies.

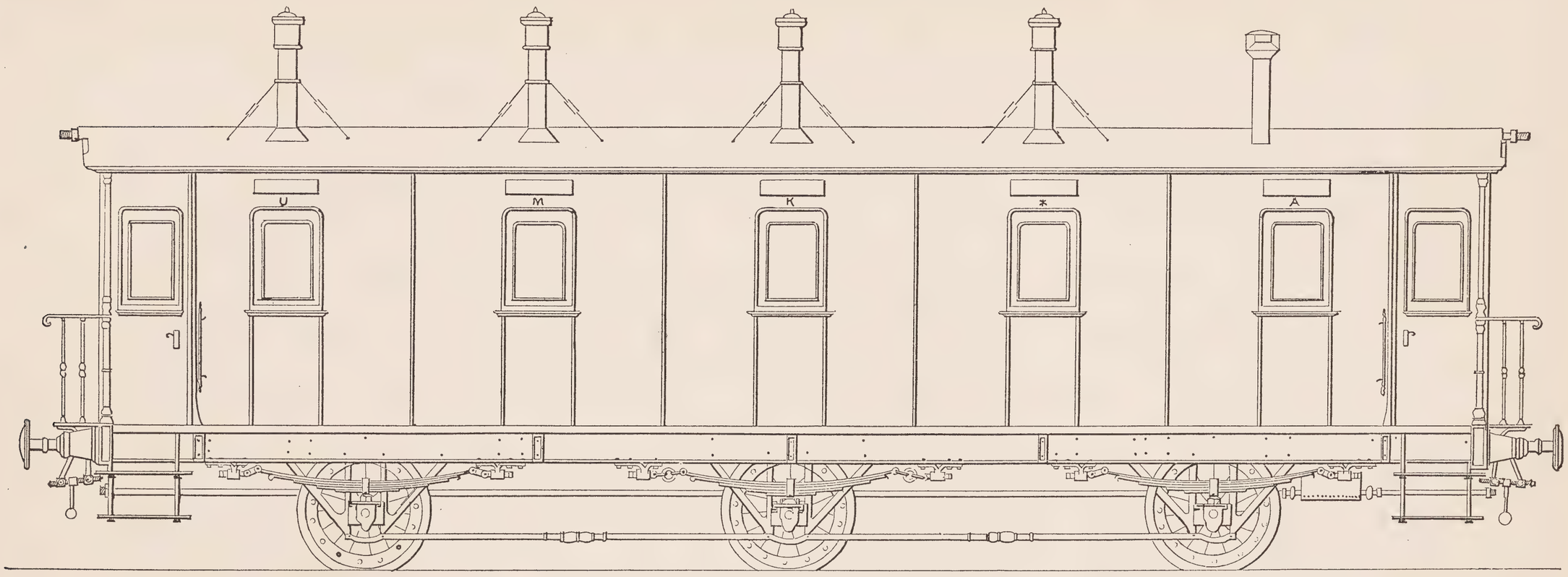
Facts show that lives are annually sacrificed upon our railroads because there is no adequate system adopted for the examination of the wheels and axles of passenger-cars. It is a well-known fact that, however homogeneous and tenacious the iron may be of which a car-axle is made, it soon becomes crystallized by use, such crystallization commencing so soon as the axle begins to rotate, and going on just in proportion to the weight which it has to sustain, the curves it is compelled to turn, and the evenness or unevenness of the surface of the rails over which it passes. That the strength of the wheel is affected by the same causes will not be denied; hence the necessity of a thorough system, adapted to the circumstances of each line of road, which will insure the removal of wheels and axles from each car before a sufficient amount of crystallization has taken place to cause them to break. It is not intended to assert that all, or the larger portion of the accidents to passengers upon our roads, are attributable to the defective construction of the cars in which they are transported; but only to direct attention to some defects which may, and do sometimes, cause such accidents, as well as to render them more disastrous when they *do* occur; and, if possible, to point out some of the remedies therefor.

The next great want of the passenger upon the rails is a comfortable and commodious seat, which shall be so arranged that he can, at any time during his trip, change it from a horizontal to an inclined position, and that he can, if he desires, stand up, without trespassing upon the domain of his fellow-traveler. In short, the great want of comfort experienced by every person who travels upon railroads grows out of the fact that they have not the necessary room to make themselves comfortable. Our railroad managers furnish us with elegant and costly cars to ride in; seats that, if they are to be criticised at all, must be called too luxurious; carpets of the finest quality, silver-mounted trimmings, and all that they think will tend to increase their gains and the comfort of their passengers, and then force us into a space so contracted that we might about as well be in a pillory. If, instead of all this, to our mind, unnecessary display, these men could be induced to build cars of less pretentious style, and give each passenger a little more room, or rather considerably more, and then spend the difference in cost between the elegant cars and the plain ones in furnishing the additional space, and in maintaining and propelling such cars, they would, it is believed, add to their dividends, and at the same time place the traveling public under renewed obligations.

In giving such prominence to the want of room in the passenger-cars of our country, it is not the intention of the writer to assert that this is the *only* thing required to afford the maximum of comfort to passengers, as it is patent to all that proper ventilation is an indispensable requisite to that result, as is also the temperature, which should be regulated as far as possible, whether the weather be warm or cold.

It can hardly have escaped the attention of travelers that in summer one great source of discomfort arises from the fact that the roofs of cars are made of very thin material, as well as of material which is a tolerably good conductor of heat, or at the best, is not a non-conductor, as it should be. The cars are exposed during the entire day to the direct rays of the sun, whereby heat is transmitted through such roofs, and directly upon the heads of the occupants, thus becoming a cause of sickness, and especially of the severe headaches with which so many people suffer while traveling. The remedy for this difficulty would seem to be very simple, only requiring that the roofs should be made of the poorest conductors of heat that are adapted to such use, and that they be made double, leaving a space between the two portions, so that when the cars are in motion the air may rush through and carry off the heat which has passed through the outer portion of the roof. Removing the vitiated air from the cars is another requisite for comfort, and it is suggested that this may be readily accomplished by inserting pipes through the inner portion of a car-roof, when constructed as above described, it being a well-known fact that a current of air blown across the end of a pipe will create a partial vacuum therein, which, if applied as here proposed, would of course relieve the pressure to such an extent as to cause the heated and vitiated air to pass out, leaving its place to be occupied by fresh, pure air admitted through suitable orifices arranged for that purpose. In order that the best results which this plan would be capable of producing may be attained, the passages between the two portions of the roof should be contracted at the points where the pipes enter them, and the pipes should be bent so that the outlet orifices would be at a right-angle to the lower or induction ones; and they should be so arranged that they can be turned so as to cause said outlet or exhaust orifices to point in a direction opposite to that in which the car is moving.

The Chicago *Tribune* says the four Pullman cars which have been building at the Detroit shops for the Vienna Exposition have been completed, and will shortly be shipped for Europe. The process of constructing these cars has been very novel, and is worthy of note. They have been set up and finished as if they were to be run on American roads, but the various parts have been manufactured in small pieces, and so put together that they can be taken apart, each piece packed in a box, and the whole car transported like ordinary merchandise. These cars will be shipped to Vienna in this manner, thus protecting the elegant work which has been put upon them from exposure during the voyage. When they arrive in Vienna, they will be unpacked and put together like an ordinary road-carriage. There are two dining and two sleeping-cars, and the four will make a Pullman palace-car train between Vienna and Paris during the exposition.



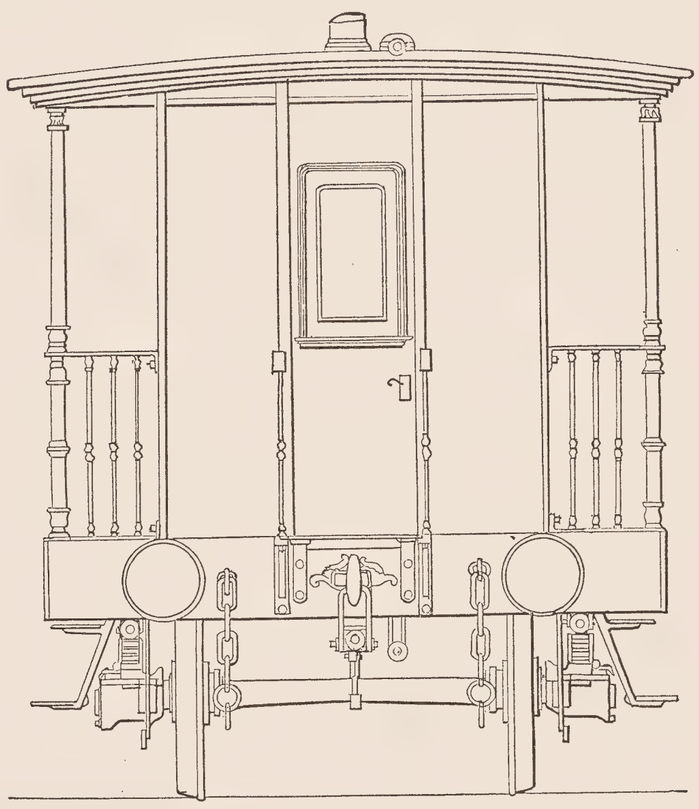
A Russian Railway Car.

THE engravings represent a side and end view of a railway carriage constructed at the Moscow works of the Moscow and Koorsk railway, and exhibited at the late Polytechnic Exhibition in that city. It is an average specimen of the first-class cars lately introduced on several of the Russian roads. We copy the following description from a recent number of *Engineering*:

"The body of the carriage is 39 ft. 9⅞ in. over all, and 9 ft. 11 in. (outside dimensions) wide at the top, tapering a little inward toward the bottom. It is divided into one large and two smaller compartments, a passage or corridor, lavatory and water-closet, boiler room, and two end lobbies.

"The large compartment or saloon is 13 ft. 9¼ in. long, and is furnished with seats for twelve persons, arranged across the car, sufficient space, however, being left to afford a through passage. The smaller compartments, which are 6 ft. 9¼ in. x 6 ft. 9½ in., have the seats also disposed transversely, and accommodate six persons each. These compartments have no through passage, and may be kept strictly private. The clear width between seats, both in the large and smaller compartments, is 2 ft. 2 in., but for the convenience of sleepers the seat-cushions may be drawn out so as to almost meet. A person sleeping under such circumstances, of course, occupies two places. The side doors of the small compartments have a mirror on the inside. The passage, or corridor, which is 2 ft. 4½ in. wide, runs along one side of the car for more than half its length, and communicates at one end with the saloon, and at the other with one of the lobbies. It has also three side doors leading to the small compartments and lavatory respectively. The lavatory is 4 ft. 1⅛ in. x 3 ft. 9¾ in., and is fitted with a marble-topped wash-stand, mirror, etc. The necessary water is supplied from a tank in the boiler-room. From the lavatory a door leads to the water-closet, which is 2 ft. 3½ in. x 2 ft. 10¼ in. The boiler-room is approached from a door through the end of the car, which opens inward. It is 4 ft. 2⅝ in. x 4 ft. 2¼ in., and contains a vertical boiler, with its attendant fittings for steam-heating purposes, which we shall explain presently. The lobbies, one at each end of the car, give access to the interior of the latter, and also serve as a barrier to the cold. Each lobby has four doors, two side ones communicating with the station platform, and two end, the one leading to the corridor, (or else to the saloon,) the other opening out on to the bridge which joins to the next car.

"The windows, of which there are ten in all, namely, four in the saloon, one in each of the smaller compartments, three in the corridor, and one in the boiler-room, are all fitted with double frames, which slide in a brass casing. This casing, cast of brass in one piece, is flanged on the outside and polished. It makes a very neat and durable job, and also strengthens the sides of the carriage. The window-glasses are 17⅛ in. x 25¼ in. As compared with our English practice, this arrangement gives far from sufficient lighting area. It, however, satisfies the Russian public, and adds to the warmth of the car, which in winter is a great object. The windows, excepting those in the corridor and boiler-rooms, are fitted with Venetian blinds. The lavatory is lighted through the door facing the corridor, which has two ground panes of glass let into it. It is further supplied with a skylight. The water-closet, in like manner, has light admitted through the roof. The top halves of three out of the four doors in each lobby are glazed.



"Lamps are not used, but small candelabras, which are fixed to the sides of the cars between the windows. Each candelabrum holds two stearine candles, which are incased up to their wicks in a cylindrical tube, supplied with a spiral spring for forcing the candle up in the tube as the former burns away. The light shines through a frosted globe. Candles are almost universally used in Russian carriages in preference to oil lamps.

"The internal fittings are got up in good style. The seats and backs to them are well padded with horse-hair, supported by spiral springs. Velveteen for covering the seats is much in vogue in Russia, as in Germany. It wears very well, but is somewhat expensive. In this case, for the sake of variety, the usual custom has been departed from in the saloon, where the seats are covered with figured woolen rep, and the walls and ceiling with the same material, but of a different color. The walls of the small compartments are lined with figured silk, and the corridor with American oil-cloth. The floor of the carriage is carpeted throughout, excepting in the lavatory and boiler-house.

"The body-framing is of wood, the sides and ends being incased in sheet-iron $\frac{1}{16}$ in. thick, and the roof being covered with canvas prepared in the usual way. The under frame is partly of wood and partly of iron. The soles, which are of wrought-iron, have an I section 9¼ in. x 4 in. x ⅜ in. The cross-beams and diagonals are of oak, while the headstocks are also of the same material, but are protected on both sides with iron plates ¼ in. thick, while they have ornamental brass caps on their ends. The buffer and draw springs are of the old bow type. The body-springs are 6 ft. from centre to centre of the points of suspension. The carriage is carried upon three pairs of wheels 12 ft. 5¾ in. apart, thus giving a total wheel-base of 24 ft. 11½ in. The wheels are 39½ in. in diameter, and the distance between the tires is 4 ft. 8½ in., the gauge of the line being 5 ft. The tires are of Russian manufacture, having been received from Obookoff's Steel Works, Alexandroffsky, near St. Petersburg. The axles, which are 6 ft. $11\frac{3}{16}$ in. from centre to centre of bearings, have journals 6¼ in. long by 3¼ in. in diameter. They are fitted with oil-lubricating boxes. The central bodies have a considerable amount of lateral play in the horn plates to facilitate going round curves. The total length of car over buffers is 44 ft., and it weighs 15 English tons.

"Ample provision is made for heating the car during the winter season by means of 2-in. gas-pipes filled with steam drawn from the boiler already referred to. This boiler carries a pressure of 25 lbs. to the square inch, and is made large enough to furnish steam for three cars, there being a separate steam-cock for each. The steam, after passing twice through the pipes, is condensed and again pumped into the boiler. This arrangement for heating requires but one boiler for a whole train of cars. The steam-pipes are all below the flooring and incased in a long box or air-chamber. The fresh air, after being heated in this chamber, is admitted by valves into the interior of the carriage. This plan has been in use four years on the Moscow and Koorsk Railway, with results so satisfactory that the company has adopted it for all the cars of the line.

"The relative number of passengers carried to the weight of the car is very small, and would be absolutely ruinous to an English railway. The American system of a through communication necessitates in this case the loss of eight seats, and the lengthening of the body of the car nearly five feet; yet in spite of these drawbacks, the system is gaining ground in Russia, and will probably in a few years entirely supersede the English."

MR. HENRY DEITZ, for several years supply agent of the Atchison and Nebraska Railroad, has recently resigned that position, and will make a temporary sojourn in Texas, on account of the health of his family.

THE St. Louis branch office of Vose, Dinsmore & Co. has been removed from 713 North Second Street to 720 of the same street.

What Caused It?

BY CARLTON LAKEY.

When a railway accident occurs resulting in loss of life and property, the news is telegraphed over the country, and the question is everywhere asked, What caused it? If the cause be assigned to a broken rail or a broken wheel, which is so often the case in severe cold weather, we settle down with the conviction that no person is blamable, as no one can be held responsible for the effects of frost.

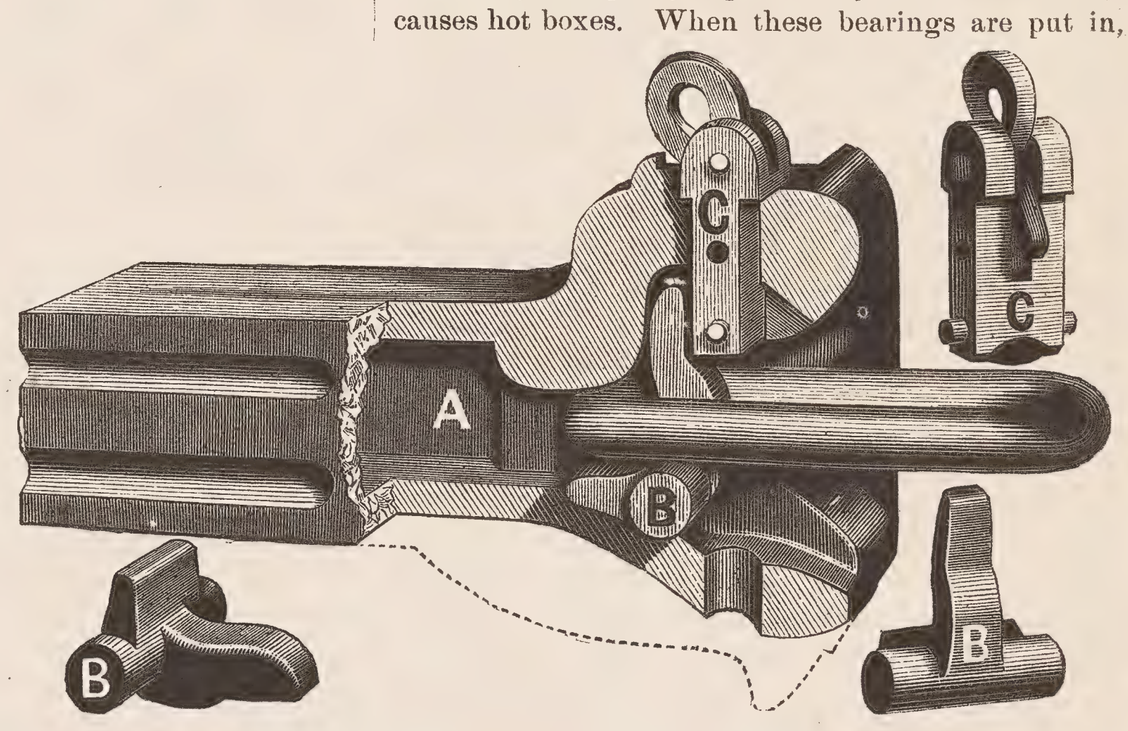
In the report of railroad accidents for the month of November, 1872, we find forty-five cases of derailment, eighteen of which are "unexplained," but the cause of which may be correctly assigned to oscillation. Now the question arises, What is oscillation? It is the side-motion of the cars of a train when running, each car vibrating independently, and giving to the train a serpentine course. It is caused by curves, swing-bolsters, elevation of outer rail, coning of the treads of the wheels, and the width of track, which is built so as to admit of the trending of short curves—a necessary evil of American-built railways. A long train oscillates more than a short one, while rapid motion, down grade, and slack couplings, greatly augment the evil. Every person who has ridden upon cars where link-couplings are used, has felt the disagreeable side-motion which is often so great as to make it dangerous to pass from car to car, or even to walk the centre aisle while the train is in motion. Nearly all the accidents reported under the head of "unexplained" are caused in this way: A train is running at the rate of forty miles an hour on a down grade, with slack couplings which give a foot or more of play between the cars. The draw-heads are placed below the line of the floor-sills—when they should always form a continuous line of resistance through the entire train—and one is often higher than that to which it is coupled. The cars oscillate more or less, and when for some good cause the engineer suddenly shuts off steam, the engine sags back upon the train, producing a blow upon the first car which increases in force from car to car as it passes through the train. One car with a draw-head higher than the one in front may at the same time strike a glancing blow, glance off and over the other draw-iron so as to lift so much weight from the truck as to permit the leading wheel to climb the rail as it impinges heavily against it. This is more easy to produce when we remember that there are no fore and-aft bearings, and a sudden check of the car-body, acting upon the centre-pin and side-bearings, has a tendency to tip the truck backward, throwing the weight entirely off the forward wheels, and often lifting them over the rails. This may to some seem too theoretical, but it is nevertheless practical, and any person conversant with the force and action of motive power, as exemplified in the running of fast trains, will perceive at a glance that it is no more than the natural result of the action of certain well-known mechanical laws. Oscillation is only known upon American roads. In England, the carriages are coupled by screws, which draw them together, the pressure resting upon spring buffers, producing tension, and making the entire train as one car. Though this system is not adapted to our roads with their short curves, it establishes the fact that tension between the cars will prevent oscillation, and consequently all accidents arising therefrom. It would be difficult to even conjecture the amount of damage resulting from this evil; and broken rails, broken trucks, spreading of rails, or broken wheels, may be safely classed among its consequences.

The recent accident on the Cross-Cut Railroad was caused by a broken flange of the tender truck-wheel. As soon as the truck frame fell upon the track there was a sudden check given to the train, and in an instant the cars plunged over the bridge and into the creek below. We are led to believe that had there been proper tension between the cars, and the coupling to the tender had been a strong one with no slack, the whole train would have passed in safety across the trestle of the bridge. It is said that the bridge is on a curve, and the broken wheel was on the outside, causing the flange to break off by lateral thrust against the rail. Had the brake been set on the hind car, thus giving tension to the train, there would have been no lateral thrust on the rail. To prove this we will cite a case in point. In the month of April, 1856, the writer was a fireman on a passenger train of the Chicago and Northwestern Railway, running from Chicago to Fulton City. The engineer's name was Thomas Rackham, and the engine a "McQueen," with 5½-foot drivers of a pattern then much in use, having a T-spoke. The spokes of the flange-driver on the left-hand side began to crack off each day, and continued to do so until every one was broken, and yet in this condition we ran her over one thousand miles, as there were very many engines disabled and the road overwhelmed with traffic. The road was called an "air-line," there being but few curves, and only one that could be called short, which was near Sterling, with the river on one side and a deep morass on the other. When we were coming east, it brought the broken driver against the outer rail, and, as would seem, produced a side-pressure, the only pressure which would break the wheel down, and yet this was rendered by the engineer the safest point on the route; and why? Because, when we were about to strike the curve he would open the throttle wider, putting on more steam, producing greater tension, and thereby holding the broken driver away from the rail, at the same time preventing all side-thrust. This is one of the fine points which engineers fully understand, and though it at first suggested an unpleasant flounder in the morass, the result demonstrated the superior skill and mechanical judgment of the engineer.

Every railroad man should make himself familiar with the causes of oscillation, as a perfect comprehension of them is of the utmost importance in the making up and running of trains. In view of creating an interest in this subject, the foregoing has been written, with the hope that it may lead to good results.

The Porter Car-Coupler.

It will be seen from the engraving below that this consists of three principal parts, which are denoted by the letters A, B, C. It is a cast-iron draw-head, provided with recesses for the reception of the rocker B and the catch C.



The action of the coupler is as follows: The link (differing in nowise from that used in the ordinary old-fashioned coupler) enters the opening of the draw-head, encountering the rear extension of the rocker B. This it forces backward, thus raising the forward arm of the rocker upward through the link, thus raising the catch C; but the instant the arm of the rocker passes into the recess beyond the catch, the latter falls and secures the arm of the rocker, which thus forms the coupling-pin and holds the link. If it is desired to *lock* the link in its place, this can be done by inserting in the catch C an additional key, forming a shoulder higher up on the catch and preventing its being raised sufficiently to remove the link.

In uncoupling, the catch C is raised, the dog operates to retain the catch in place, and the link on being withdrawn carries with it the pin B, which falls into the lower recess of the draw-head, as before coupling.

The inventor makes the following statement of the advantages he claims for his invention: "Its weight, when made in the most substantial form, is about 300 pounds per car. Estimating the castings at four cents per pound, and the wrought pins at ninety cents each, the total cost of the apparatus comes easily within $14 per car, exclusive of royalty. The average cost of wrought-iron draw-heads and the fixtures now in use is not less than $35 per car, and it is claimed the Porter coupler will outlast two of those ordinarily used." We believe that some of our readers will feel disposed to question those claims. If they do, the inventor, Mr. A. Porter, of Chicago, can give them further information if desired.—*Railroad Gazette.*

Freight-Car Side-Bearings.

BY W. E. PARTRIDGE.

By the general consent of car-builders, the most approved side-bearing consists of the plain slide, with about three fourths of an inch space between the upper and under surfaces when the car is at rest on a straight track. Yet, in spite of this uniformity of opinion in regard to it, there is hardly one of the many details of car construction that presents such a great diversity of form.

It was formerly supposed that a roller was necessary to make a car curve with ease, and when a bearing of this kind is new, it is without doubt the easiest of any. The single rocker was then tried, and is still in use on many roads. The large roller, or large double rollers hung on journals, are constantly seen on our through lines. Many roads have used the small double roller, and also the chilled iron ball-bearing. Theoretically they are very fine, but practically they are utterly valueless; and the reason why they become so is very evident when it is remembered that a car has a constant side-motion, against which it is impossible to provide. It is this motion which wears down the tops of the rollers, rockers, and friction-balls. The latter having a free motion in all directions, it would naturally be supposed they would escape flattening; but the fact seems to be that the socket fills with dust and cinders, and, in consequence of the pressure and moisture, makes a seat for the ball, in which it does not turn when the truck moves on the king-bolt; in this way the ball is converted into a slide of a very objectionable pattern. Rollers are also converted into slides in the same way, with the additional disadvantage that, like the rockers, they usually get so much out of place that the load rests very unequally upon the journals and often causes hot boxes. When these bearings are put in, as is usually the case, with rollers and sockets of soft iron, not chilled, they become about as bad as they possibly can be. It is usual for car-builders to say that they intend to carry the whole load on the centre-plate, and leave, say three fourths of an inch slack between the surfaces of the slides; but in practice the car-body soon gets down, and the weight is divided between the side-bearings and centre-plate.

The best form for a slide seems to be one proportioned somewhat like those used on the Erie Railway, which are made of chilled iron and are 8 inches long by 4 wide. The oil-box in the centre is 6 inches long by 2 wide, and 1½ inches deep. This gives a bearing

surface of 20 square inches, and provides abundant lubrication for a very long time. The surface on the transom is 12 inches long, which is ample for roads with moderate curves. Bearings of this pattern, after a short usage, became almost as smooth and bright as a mirror. In getting a car upon the track, they give no trouble, as the parts are always sure to be in place as soon as the wheels strike the track, there being no rollers or rockers to get into position and keep in place. Not unfrequently, however, in consequence of faulty construction, this style of bearing becomes as objectionable, or nearly so, as the others to which we have referred. One of these errors in construction consists in too short a surface, with an insignificant oil-box. It is not uncommon to see a strap of wrought-iron on the transom made to serve for the upper bearing.

The method of securing the parts of a bearing to the timber is worthy of attention, especially in the case of wooden trucks. Very often the lower bearing is held in place by bolts going directly through the side stick of the truck, the bolt-holes weakening the timber at a point where it should have the greatest strength. Mr. Jones, of the New-York Central shops at West-Albany, uses a style of fastening which at first sight appears clumsy, but a closer examination shows it to be perfectly correct. Instead of running the bolts through the timber, he applies a strap or yoke in the form of a ∩, which clasps it on either side, the ends passing through the flat piece of iron underneath, upon which they take a bearing by nuts screwed on each. The value of any plan which leaves so important a stick without bolt-holes or mortises is very obvious, and sufficient to compensate for many disadvantages, or even to justify an increase in the first cost.

New Street Railroad Cars.

THE Cleveland Bridge and Car Works have recently completed six very beautiful cars for the Louisville, Ky., City Railroad Company. They differ in their construction very materially from the ordinary street-car, being much wider, and having the seats placed crosswise, with a passage-way between, like those of a railroad passenger-coach. Each seat holds two persons. The roofs are plain, curved ones, with end ventilators. The sides of the car-body are nearly parallel, with scarcely any curve from fender to bottom. The outside length of the body is 16 feet, and the width from outside of posts, 8 feet. The wheel-gauge is 5 feet. Higley's patent running-gear is used under these, as it is under all the street-cars made at this establishment. There is but one platform, which is in front, and can be used for an engine and boiler in case steam power should be adopted instead of mules. At the rear end is a step sufficiently long to enable passengers to step clear of the rails, which is a manifest improvement upon the covered omnibus-step used on many roads.

The appearance of the interior is very much like the ordinary railroad day-coach. The seats all face one way and are not reversible. Each rests upon two malleable iron supports, which are extended upward so as to give form to the backs. The bottoms and backs of the seats are not upholstered, but consist of alternate two-inch strips of walnut and ash, a plan which is preferable to upholstery, as the seats can be more easily cleaned. There are no arm-rests next the central aisle, which makes the seats easier to enter and leave. This arrangement of seats is, in our judgment, superior to the old plan for street-cars, as the whole space is thus occupied, or nearly so, leaving no standing-room.

The Higley running-gear to which we have referred is a very popular one for street-cars, and we do not know of a street railway company that have not adopted it after once giving it a fair test.

A COLORED hod-carrier of Peru, Ind., caught a rafter of a falling building on his head. It was badly broken —the rafter.

The Car Manufactories at Wilmington, Delaware.

THE geographical position of Wilmington is a very favorable one for the manufacture of railway cars, being near the traditional line between North and South, and having coastwise communication with the lumber regions of both sections. The inland sources of iron and coal are accessible by rail, and within easy reach; while the numerous diverging lines of railway afford facilities for the ready transportation of cars to every part of the country. These important advantages have contributed to the rapid growth of the business, until it has become the leading feature of manufacturing industry in the place. More railway passenger-cars are built here than in any other city in the country, and the brief notices of the several establishments we now give are the results of a somewhat hasty visit made a few weeks ago. First in the order of precedence are

THE HARLAN AND HOLLINGSWORTH COMPANY'S CAR-WORKS.

This company was organized nearly forty years ago, and is one of the oldest car-building establishments in the country. In addition to this branch of their business, they are also extensively engaged in building iron steamships, some of them of the largest class; also land and marine engines, boilers, sugar-mills, and machinery of various kinds for railway and other purposes. The works occupy a space lying between the track of the Philadelphia, Wilmington, and Baltimore Railroad, and the central portion of the water-front of the city, and are provided with the best facilities for docking and launching vessels, receiving material, and shipping the various products of their manufacture. Upward of a thousand men are employed in the two general departments of car and ship-building.

Our present notice will be confined to the car department, which is devoted exclusively to the construction of passenger-cars, comprising the various classes, from the ordinary smoking-car to the largest and most elegant sleeping and drawing-room coaches. No freight-work is done, for the reason that the two classes of cars are so essentially different in many respects that they can not be made to advantage in the same shops. Men who are familiar with one kind of work become less efficient when transferred to the other kind, and there is a perceptible loss of time, skill, and dexterity, which tells more or less on both. The capacity of this department has recently been materially increased by the erection of a new two-story building 300 feet long by 80 wide, the first floor of which is used for the painting and finishing of cars, and the second for upholstering, varnishing, and cabinet-work. The entire available track-room is sufficient for thirty-four cars of average size, and provision has been made for a plentiful supply of light and air.

The special attention given to the construction of passenger-cars, together with the long experience of the company, and their familiarity with every step of progress, from the first rude beginnings to the present standard of completeness, enable them to turn out work of the very best description. They have already built 26 sleeping and drawing-room coaches for the Pullman Palace Car Company, and are now executing orders for the same company, and for various Southern and Western roads. We noticed three Pullman coaches just completed, and designed to run on the Pennsylvania Central road, which are, in substantial workmanship and elegant finish, as perfect specimens of car construction as we have ever seen. The body dimensions are 50 feet long by 10 wide. They run on 6-wheel trucks of the Pennsylvania standard pattern, and are equipped with the Westinghouse brakes, Baker heaters, and Carroll ventilators; also an apparatus for distributing air from the bottom of the car. The floors are diagonal and double. The central saloon has 11 revolving chairs, and there is also a private drawing-room adjoining, containing five seats. At each end of the car is a smoking-room with six seats. One of these is separated from the central part by a wash-room and closet, and the other by the heater and linen-locker. The finish of the interior is as elaborate and luxurious as elegant upholstery, costly woods, beautiful paneling and inlaid-work, chandeliers of exquisite design and workmanship, embossed glass, and artistic head-linings, can make it. It would seem that nothing more in the way of luxurious fitting-up could be devised or required. To attempt any thing further in this direction would border on excess and ostentation. Mere splendor, for its own sake, is not an essential thing in the commonplace matter of traveling, but may be indulged so far as it is compatible with comfort, and is made to harmonize with the genuine instincts of true refinement. Our people, however, like this kind of thing, and the passion grows by indulgence. They are quite willing to pay for it, and so long as there is no grumbling on this score, new and more costly styles of ornamentation and luxurious devices will be discovered and brought into requisition, until the resources of artist and artisan are exhausted. It must not be inferred from this, however, that the interior finish of the coaches alluded to is in any respect tawdry or overdone; on the contrary, there is good taste, harmony, and adaptation manifest in every detail, and a unity is preserved throughout. The head-linings do not stare the carpets and upholstery out of countenance, nor is every thing duplicated by mirrors.

We also noticed in process of construction nine day-cars for the Great Western Railway of Canada. These are 52 feet body-length and 10 feet wide, and will seat 60 passengers. They have 4-wheel trucks of the road standard, Creamer ventilators, Miller platforms, two Howard heaters in each, and a signal-lamp in each end just below the roof. Buntin's seats are used, and the interior is elegantly and tastefully finished in French walnut and Hungarian ash. The roofs are of canvas, and the bottom of the cars are sealed, the intermediate space between the sealing and floor being filled with saw-dust to increase the warmth and deaden sound.

The company also have a European order for two cars of peculiar construction, and designed to be used on an inclined plane near Vienna, to convey passengers to an elevated and attractive place of resort during the Exhibition. The inclined plane is 8000 feet long, and the cars are to be propelled by stationary power and a steel cable two inches in diameter. They were not begun at the time of our visit to the shops, and we can only give an idea of them from the general specification. They are to be 30 feet long, 10 wide, and 7 high in the body, and be divided into five coupé or sections, with side doors for each. Above the car-body proper will be a second story or deck, accessible by iron steps at each end, and covered by a light roof to protect the upper tier of passengers from sun and rain. The lower part will seat 60 passengers, and the deck about 40. The general workmanship and finish will be in the best Pullman style. The cars will be regularly entered at the exhibition, and will be creditable specimens of American skill as respects design and construction, and the opportunity will be afforded of practically testing their capacity.

The works of this company are now employed to their full capacity in both car and ship-building departments. An idea of their location and general appearance may be obtained from the cut in our advertising columns. Nearly every detail which goes to make up the completed car is produced in the shops. In the operations of the several departments, order, regularity, and system are every where apparent, and the business moves along with the precision and steadiness of a well-constructed piece of machinery. We do not wish to imply that in this respect the establishment of the Harlan and Hollingsworth Company is exceptional, but it is a feature so apparent as to strike the observer at once.

The numerous buildings which constitute the works are somewhat irregular in their structure and relative positions, having been erected at different times, as the growth and extension of the business required.

THE DELAWARE CAR-WORKS.

These extensive works, of which the Jackson & Sharp Company are the proprietors, are situated on a tract of land comprising an area of about eight acres, flanked on its two sides by the Christiana and Brandywine Rivers, with the track of the Philadelphia, Wilmington, and Baltimore Railroad running along its front. The best facilities are thus afforded for receiving material, launching vessels, and shipping by water or rail the cars and other products manufactured at the works. The location, relative position, and general appearance of the several structures, with their immediate surroundings, are very correctly represented in the engraving which may be found in our advertising pages. In addition to the construction of railway cars of all classes, which constitutes a leading feature of the business, there is a department for the manufacture of doors, sashes, and blinds, for general building purposes, and also a ship-yard and marine railway, with facilities for building steamers and sailing vessels, (except iron ones,) for coastwise traffic. The entire force employed in all the departments is about 900 men, the larger portion being engaged in the car-shops. The various buildings, as regards relative position, size, and general adaptation to the purposes for which they are designed, are as commodious as they well could be, in view of the fact that they were not all constructed in accordance with an original plan, but are the result of additions and improvements, rendered necessary from time to time, as the growth of the business required.

The car department consists of the usual shops for wood-cutting, forging, framing, painting, and other incidental and collateral work, all of which are provided with the most improved and effective machinery for turning out work with economy and dispatch. As our visit to the premises was made on one of the cold days, if not the coldest, of the present season, we must not omit to mention the admirable manner in which the shops are warmed. The heat is supplied by two large upright boilers, used specially for the purpose, and is conveyed by pipes to all parts of the establishment, the total length of all the pipes being more than five miles. These boilers are kept heated night and day, and a constant and uniform temperature, suited to the work done in each shop, is maintained. The temperature of the paint-shop is never allowed to fall below 65°. The room where the varnishing is done is supplied with a very effective ventilating apparatus, by means of which the volatile parts of the varnish are carried off with the exhaust-air, and a corresponding quantity of fresh air, already warmed, introduced in its place. This very much facilitates the drying process, as it is very well known that mere heat alone is not sufficient.

The company is now engaged in building almost every kind of car for passengers and freight, ranging from the palatial Pullman drawing-room coach to the ordinary hand-car; and such is the capacity of the works, that fifty or sixty cars of all kinds are in progress at the same time when the full force is employed. They have now in course of construction a number of Pullman coaches, and also several day-cars for roads at the South and West. We noticed a number of the latter class completed and ready for shipment. They each seated sixty passengers, and, as regards substantial workmanship, tasteful decoration, and elegant finish in all the details of upholstery, ornamental wood-work, head-linings, etc., they are equally creditable to the builders and the road on which they are designed to run, and fully up to the requirements of a fastidious traveling public.

The Jackson and Sharp Company were the first, and have thus far been almost the exclusive builders of narrow-gauge passenger and freight-cars, having supplied the entire passenger equipment of the Denver and Rio Grande and other narrow-gauge roads. These cars have, so far as we know, given entire satisfaction in the severe tests to which they have been subjected. Those made for the above-named road are 35 feet long, 7 wide, and 10½ high, and weigh 15,000 pounds. They seat 36 passengers, the seats being double on one side and single on the other, alternating in the centre so as to provide for an equal distribution of weight when the car is full. The sills of these cars are only 27 inches above the track, and the average weight per passenger only 416 pounds.

Another novelty in the way of car construction which has been produced at these works is a style of car specially designed for the Greenwich Street Elevated Railway, in New-York City, and which was noticed in a recent number of THE CAR-BUILDER. Four of these vehicles were placed upon the track in August last, and so skillfully were they designed, and so well adapted to the peculiar service required, that four additional ones have just been added to the line with no material alteration of the original pattern. It will be recollected that the central flooring of these cars, between the trucks, is two feet lower than the platforms, and only six or eight inches above the track, thus greatly lessening their liability to overturn. They seat forty passengers each, are far more elegantly fitted up than the ordinary street-car, can be run at a speed of twelve miles an hour with the greatest steadiness, and easily turn curves of 50 feet radius. Since the track has been equipped with them, it has ceased to be regarded in the light of an expensive mechanical failure, and now bids fair to be a successful innovation upon the ordinary methods of city transit, and also a paying enterprise.

Our limits will not permit us to notice all the interesting features of this establishment as respects the character of the work done and the various mechanical appliances employed for the purpose. We must not omit, however, to mention that special attention is given to the painting of head-linings. All that are used by the company are made in the establishment, and are the product of skillful, conscientious hand-labor. No printing or other cheap device is employed to produce an effect devoid of any real, artistic merit, and pleasing only the superficial observer. This branch of car-decoration is capable of much greater development as an art than it has yet reached, and should receive more attention from car-builders generally than is usually given to it. There is much room for improvement in the style and variety of patterns, and in the harmonious adaptation of colors and lines to the wood-work, upholstery, and interior lighting of cars. A mere mechanical eye, with no guide but the freaks and vagaries of the fancy, is not sufficient. A genuine artistic taste, and a native perception of the elements of the beautiful in form and color, are indispensable in the production of good head-linings, and every real improvement in this respect the traveling public will not be slow to appreciate.

A new blacksmith-shop and boiler and engine-room have recently been completed. A new Allen engine has also been put in with 13x24-inch cylinder, and runs at a speed of 150 revolutions per minute. There are also extensive facilities for drying lumber by steam. The stock of lumber is very large, as it necessarily must be to supply the material for the several departments of ship and car-building, and wood-work for sashes, doors, and other purposes.

In the way of precautions against fire, the dreaded enemy of establishments like this, there are distributed about the premises 26 Babcock Extinguishers, and there is also a 6-inch main from the City Water-works, with a pressure of fifty pounds to the inch.

The works are under the general superintendence of Mr. William S. Auchincloss, the Vice-President of the company, an engineer of established reputation and author of a valuable work on *Link and Valve Motions*, which has been adopted as a text-book in several universities and colleges.

THE WILMINGTON CAR-WORKS.

These works are located on the north side of the Brandywine river, a short distance from the Delaware Car-Works, and front on the Philadelphia, Wilmington, and Baltimore railroad. They commenced operations within the past year, and the several shops have all been recently constructed. The proprietors are Messrs. Bowers, Dure & Co. Mr. Bowers, the senior member of the firm, was formerly in charge of the car department of the Harlan & Hollingsworth Company, and was also for several years superintendent of the car-shops of the P. W. & B. Railroad. His experience and capacity have largely contributed to the successful and rapid growth of the business now done by the firm. The buildings are of wood, and consist of a paint-shop with floor room for twenty passenger coaches, an erecting-shop 70 x 200 feet, a two-story wood-working and machine-shop, a blacksmith-shop, transfer-table, etc. The business is mainly confined to passenger-work. A few freight box cars were under way at the time of our visit to the works.

A number of Pullman sleeping and drawing-room coaches were completed some time ago and sent to the West, where they were highly commended for their superior construction and finish. The works are now engaged in executing an order from the Pullman company for six sleeping-coaches. They also have a contract with the Northern Pacific road for eight day-cars, which are nearly completed. Several cars of a like description are also in progress for the Baltimore and Potomac, and North-Pennsylvania roads; also a passenger and smoking car for the Pittsburg and Castle Shannon narrow-gauge road. These cars are 35 x 7 feet, body dimensions, and seat 34 passengers. The Northern Pacific cars are 44 x 10, exclusive of platforms, and seat 50 passengers. They have four-wheel trucks, Miller platforms, Howard's heaters, Creamer ventilators, and Dinsmore springs on the the equalizing bars. As respects substantial framing, good material, tasteful interior finish, and excellent workmanship throughout, they will compare favorably with any cars of their class to be found on any road.

Considering the comparatively short time the establishment has been in operation, the work it has already turned out, as respects quality and quantity, promises a successful growth and development which will give it a rank among the best in the country. The equipment of machinery is of the latest and most improved kinds. We noticed a band-saw which cuts timber with marvelous speed and precision; also a McBeth, Bentel & Margedant's Universal Wood-Cutter, by which a piece of wood can be fashioned into almost any form at the shortest notice; also a very effective labor-saving machine in the blacksmith-shop, for bending bars of iron.

THE PHILADELPHIA, WILMINGTON AND BALTIMORE RAILROAD CAR-SHOP.

The construction and repair shops of this road are located in Wilmington, the machinery department being in charge of Mr. S. A. Hodgman, the master mechanic, and the car department under the direction of Mr. George W. Perry, the master car-builder. Besides the necessary repairing, a good many new cars are built to keep up and improve the equipment of the road. The track is a very favorable one for rolling-stock, being comparatively free from curves and grades. Two kinds of passenger coaches were under way in the shops, one kind 48 feet long, with four-wheel trucks, and the other 51 feet in length, with six-wheel trucks.

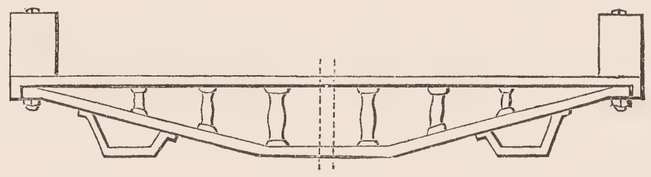
To give an idea of the quality of the work done under the superintendence of Mr. Perry, we will describe as well as we can from a very hurried inspection, a car recently completed and running with the regular trains, and to which our attention was specially called. It is a day-car 51 feet long by 9 ft. 10 in. wide in the body, and will seat 62 passengers with the heater in, or 64 without the heater. It is mounted on six-wheel trucks of a style designed by Mr. Perry, and specially adapted to a straight and level track, the elliptics being somewhat lighter than are ordinarily used on this size of truck. This, in connection with side-bearings of a peculiar construction, give the car a very easy motion. The raised roof has Crea-

mer's exhaust ventilators, and those for supplying air are placed in the body, between the racks. There is also a sliding-sash in the doors, and a transom window in the monitor roof, which can be used for admitting air when required. The saloon closet has more available room than usual, the side partition being on a line with the car-seats, and projecting about nine inches from the closet door, so that the entrance is somewhat concealed from the view of the car occupants. Buntin's seats are used, upholstered with crimson plush, and ornamented with nickle-plated arm-rests. The backs have double curves, and can be raised or lowered by means of Perry's patent back-irons, but can not be reversed at the pleasure of the passengers. The backs are also hung upon the irons in such a way that they can be tilted forward or back at an inclination to suit the occupants, thus affording a seat not altogether rigid in form and adjustment. The interior finishing is extremely tasteful and elegant, consisting of rosewood, French walnut, and other choice woods. The car is warmed by Baker & Smith's heater and lighted with Williams, Page & Co.'s lamps. The general appearance of the interior is a very attractive one to the traveler, the effect being heightened by the harmony of the ornamental work, and the absence of violent contrasts in colors and lines. The head-linings are suited to the upholstery, and a unity is preserved throughout, which pleases even those whose tastes have not received artistic cultivation. There are several of these cars now on the road. The Westinghouse brake is used, although opinions favorable to Smith's vacuum brake are gaining ground on this and other roads.

The Mount Clare Shops of the Baltimore and Ohio Railroad.

THESE shops are located in the city of Baltimore, and are the oldest and most extensive ones of the kind in the country, covering an area of about forty acres, and at present employing a force of nearly 2000 men. Besides the construction and repair of cars and locomotives of every class for the entire line of road, all the miscellaneous work for more than a thousand miles of track is done here, involving a multitude of details, numerous shops and departments, and a complete and thorough organization. The works are identified in their origin with the beginning of American railroads, and their operations have increased in a ratio corresponding with the progress and development of the system within the past forty years. There may still be seen about the premises many antiquated and interesting relics of the past, illustrating the primitive notions which once prevailed in regard to the construction and operation of railroads. It seems to us that if some of these original devices, including machinery and the various appliances long since superseded and forgotten, but which still exist in scrap-heaps or in the general form of rubbish, could be collected and preserved, they would constitute a museum of mechanical curiosities very interesting to the present generation, and likely to be much more so to those of our posterity who will manage our railroads and travel on them a hundred years hence. Some of the original turn-tables, *eight feet in diameter*, used at these works, are still to be seen, and some of the locomotives which were turned on them are still doing duty about the premises. They run on four wheels, all drivers, have upright boilers and cylinders, the pistons being connected by a walking-beam. They are called "grasshopper" engines, from a fancied resemblance in their form to that insect, and in their general appearance bear unmistakable indications of belonging to a remote mechanical antiquity.

Mr. John C. Davis is the master of machinery of the entire road, and Mr. Samuel Houston is the master-mechanic of the Mount Clare shops. Our space will not permit us at this time to notice the locomotive and general machine-shops, which are very extensive and embrace innumerable details. Our attention, during a hasty visit a few weeks ago, was confined more especially to the car department. The passenger work is in charge of Mr. Jacob S. Schryack. There are two erecting-shops; in one, the floor-framing of a number of passenger and postal cars are in progress, and consist exclusively of Southern pine. The length of these cars is 51 feet 7 inches by 10 feet wide outside of body. The side-sills are $5\frac{1}{2}$ x $7\frac{1}{2}$, the four intermediates $3\frac{3}{4}$ x $7\frac{1}{2}$, the end-sills 6 x $7\frac{1}{2}$, and the truss-planks $2\frac{3}{4}$ x 12. Wrought-iron plates in the form of an L are placed in the corners and strongly bolted to the end and side sills. Every thing about the framing is designed to secure the greatest strength compatible with the bulk and weight of material. Our attention was specially called to the iron body-transom—as near as we can name it while waiting for the forthcoming "Dictionary of Terms"—which is attached to all the passenger-coaches built at these shops. Instead of the plain piece of timber ordinarily used, a wrought-iron plate 12 inches wide and $\frac{3}{4}$ thick is bolted to the sills, with a lip turned over at each end to hold more firmly an angular plate underneath of the same width and thickness, the central part of the lower plate resting on the truck bolster, where it is held by the king-bolt, as



shown in the cut. This iron frame-work has great strength, and is not liable to shrink, warp, or split, as is often the case with wood.

In the adjoining shop were a number of cars unfinished and showing the character of the side and roof framing, the sills and plates being connected by 44 $\frac{5}{8}$ iron rods, and the sides further strengthened by 18 ash spur-braces held by iron bolts.

In the paint-shop, which is a model structure of its kind, with room for thirty cars at a time, were a number completely finished and ready for the track They have 6-wheel trucks with strong check-chains attached. Each car has two plain wood burning stoves inclosed in iron screens. The doors are locked, so the fire can not escape in case of overturn. This method of heating has proved very satisfactory. Cobb's elliptic spring seats are used, upholstered with crimson plush and provided with back-iron locks. The roofs have Creamer's exhaust ventilators, the air being admitted by supply ventilators underneath, on a line with the racks. The windows, doors, and panels have semi-circular tops, and there are sliding sashes in the doors for ventilation. The ornamental finishing is very rich and tasteful, and consists of the usual variety of choice woods. The raised panels are French walnut, and the doors are mahogany. The head-linings are made by Howard, of Hartford, and exhibit in variety, tone, and adaptation a progressive improvement in this important feature of car decoration. In one of the cars we specially noticed the admirable effect of a head-lining, so perfectly harmonizing in its subdued tints, graceful lines, and artistic blending and juxtaposition of color, with the upholstery and cabinet-work of the rest of the interior as to form in the combination a genuine work of art, not merely accidental, we are inclined to think, but the result of a right perception of what is required. Each car is supplied with water-coolers, enameled inside, and manufactured by John A. Goewey, of Albany. About three passenger-cars per month are built in this department of the works.

The freight-car shop is circular, like a round-house, with a turn-table in the centre. From 60 to 70 new cars are built here every month, besides keeping up the repairs for the freight traffic of the road. The standard freight-car truck used on the road is quite peculiar in its construction as compared with those used elsewhere. The framing is simple and inexpensive. Two sets of elliptics are used under the bolster, and the brakes are applied between the wheels. We intend in a future number of our paper to give an engraving of it, which will convey a better idea of its design and construction than any mere description we could now give. It is no novelty on the road having been in use several years with the most satisfactory results. The box-cars built here weigh about 20,000 lbs. They are 30 feet long, 8 feet 4 inches wide outside, and 6 feet 3 inches high inside.

THE PRESIDENT'S CAR.

Some months ago, a car was built at these shops designed for the special use of the president of the road, John W. Garrett, Esq. The best skill and resources of the car department were brought into requisition to produce a vehicle creditable to the builders and suited to the service for which it was designed. It has already made several trips to New-York, and has elicited the admiration of all who have examined its structure and finish. When not in use it is kept in a special house at the Camden station, in Baltimore, where we had an opportunity to inspect it, and for which we are indebted to the politeness of Mr. Schryack, of the Mount Clare works.

The car is named the "Maryland," and is 51 feet long by 10 wide outside the body, runs on six-wheeled trucks with strong check-chains attached, and with Dinsmore springs on the equalizers. Iron body-transoms are used of the kind represented in the foregoing cut. The outside of the car is painted a light yellow, with nothing in the way of external ornamentation to attract special attention or indicate the quality of the interior fitting-up, which is in the best Pullman-coach style. The car is designed to run always in the rear of a train, so as to afford a view of the track from the end windows. A glance at the arrangement of the interior indicates at once that the vehicle is designed for but one principal occupant with his traveling suite. There are four distinct compartments, a porter's room, state-room, a sleeping and toilet-room with side passage and closets, and the parlor or drawing-room. The porter's room occupies about ten feet of the forward end of the car, with a closet for table-ware on one side of the door, and a Baker & Smith heater on the other. Next to this is the state-room with an upper sleeping-berth on each side, and seats for eight persons underneath, and which can be transformed into two lower berths. Next is the central compartment, occupying a space of about 17 feet in length, and containing the principal sleeping and toilet-room, and corridor, with a door and two windows in the partition between. There are also included in this division a water-closet and linen-locker, communicating with the sleeping-room. This room is sumptuously furnished. Across one end is a curtained lounge. The bedstead is an elaborate piece of cabinet-work in French walnut, surrounded with heavy double damask crimson and green curtains. The window-curtains are of the same description, and hung, like the others, on silver-plated rods. Two large mirrors occupy the spaces between the windows. The remaining portion of the car, comprising a space of about 15 feet and extending to the rear end, constitutes the drawing-room, which is entered by a door from the side passage above mentioned. Its furniture consists of a large and elegant sofa-lounge, an oblong black-walnut centre-table with marble top, two easy-chairs of the Pompadour style and two others of a different pattern. This apartment has five windows on each side and three in the end, these last affording a fine view of the track. The spaces between the side windows are occupied with mirrors, and the curtains are of the same kind as those in the sleeping-room. The floors have Brussels carpets. The interior finishing throughout is in solid black-walnut, with elaborate raised paneling of French walnut "burl," with semi-circular tops. The general effect is somewhat sombre, but is relieved by light gilt mouldings above the windows. The artificial lighting is done by four of Williams, Page & Co.'s improved plated lamps. Carroll ventilators are used, and all the windows have double sashes. In the central passage-way is a wash-stand with a reservoir underneath holding a barrel of water, which is raised by a small force-pump. The inside door windows are beautiful specimens of embossed glass.

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Editorial Announcements.

Correspondence.—*We cordially invite the coöperation of the railroad public in affording us the material for a good mechanical paper. Articles relating to rolling-stock and machinery, by those practically acquainted with those subjects, will be gratefully received. All communications must be addressed to Vose, Dinsmore & Co., No.* 1 *Barclay Street.*

The name and address of the writer must accompany all communications designed for publication.

Advertising Rates.—*For one square, or one fifth of a column,* $5 *per month, or* $50 *a year. For half a square,* $3 *per month, or* $25 *a year. Larger advertisements by special contract.*

All communications in regard to advertising should be addressed to L. F. Dinsmore, *Post-Office Box* 4055, *New-York City, who is our agent for advertising, and authorized to make contracts, collections, etc.*

Engravings and Illustrations.

We would invite the attention of Master Car-Builders and others to the advantages to be derived from publishing in The National Car-Builder *engravings designed to illustrate the various features and details of car construction, and especially such improvements as can not otherwise be clearly presented. We will procure cuts to be made in the best manner from drawings or models that may be sent us, and charge only for the cost of engraving, inserting the same in our paper with suitable descriptive details, without charge.*

The Car-Heating Problem.

In our rigorous climate some method of warming railway cars is an absolute necessity. Their elaborate fitting up and costly ornamentation would be a mere mockery at this season of the year without the comfort derived from artificial heat. This must be had in some way, at the risk of disaster and hazard of life, if it can not be provided on safer conditions. To heat cars so as to make passengers comfortable, avoid roasting and scalding them in case of accident, and present no serious obstacle to wholesome ventilation, is a problem beset with difficulties. The various opinions entertained by railroad managers, and the different methods employed, are sufficient evidence of this. To hit upon a plan that will in its practical working involve the least risk, while it meets all essential requirements, is very greatly to be desired. With recollections of Angola, Carr's Rock, and more recent disasters of the same class haunting the public mind, it is not surprising that the subject should at this time of the year attract a good deal of attention.

Among the many suggestions contained in the newspapers in regard to the best method of warming cars, we notice one in the editorial columns of a leading city journal severely censuring railroad companies for not employing the exhaust steam of the locomotive for that purpose, and alleging that the heating of our ferry-boats by steam from the boiler, with no danger of bursting pipes or scalding passengers, showed that the same method would work equally well for railway cars. Now, intelligent people hardly need be told that all the steam a locomotive can make is required to propel itself and the train. There is none to spare either from boiler or cylinders, the exhaust being all used to keep up the draught. Even if this were not the case, there are other difficulties in the way. Steam conveyed in cold weather through the numerous pipes and connections necessary for a train of average length, would condense rapidly, the water would be liable to freeze when the cars are not running, and the trouble of connecting and disconnecting the pipes would be considerable. The conditions which pertain to a train of cars heated by steam are by no means analogous to those of a ferry-boat. If the author of this suggestion can contrive some way to increase the steam-generating capacity of locomotives without increasing their weight, his plan of heating cars would then be less an open question.

The other means for warming cars are steam-boilers or stoves placed in each. Wood or coal is required for each of these methods, and where there is fire to warm there is fire to consume. The essential thing is to have it so securely locked up that in case the car should be thrown from the track or rolled down a declivity, it could not escape so as to set the painted and varnished wood-work in a blaze before the passengers could be rescued. We think stove fires might be so secured, or at least much more effectively than they now are. In this connection we would suggest that all passenger trains should in winter be provided with fire-extinguishers, axes, sledges, and grappling-irons, so that a car can be instantly torn to pieces, and the victims caught in the wreck taken out. These needful appliances would cost but little, and could be carried in such a way as to be accessible in an emergency.

We are of opinion that when this car-heating problem reaches a solution by the adoption of some approved and uniform system, the result will be a plan by which the body of the car can be supplied with warm air from a chamber in connection with it, the air being admitted as the comfort of passengers may require. Something like this has already been adopted in Russia, and with very satisfactory results, as will be seen by referring to the description on another page. The air-chamber is underneath the flooring, and is heated by steam-pipes connected with a boiler in the end of the car-body. The fresh air, after being heated in this chamber, is admitted by valves into the interior, thus supplying both warmth and ventilation. This plan looks well at a distance, and although in its mechanical details there may be some things repugnant to our notions, it is worth considering, and may be the means of putting us in the way of an ultimate settlement of the twin questions of heating and ventilation as applied to cars.

New-York Elevated Railroads.

We believe in steam street-cars for local city transit, especially for a city like New-York, where the great current sets in the morning toward the mercantile centre of business at the lower extremity of the island, and at night the same current with equal volume sets in the opposite direction. The horse-car facilities, which answered very well a dozen years ago, are becoming more and more inadequate to satisfy the demands of the public. The climax has very nearly been reached. A change of some sort is absolutely necessary, and can not be deferred much longer. The increasing popularity and business of the Greenwich Street Elevated Railway is an evidence of this. After surviving many vicissitudes and being a target for ridicule as a stupendous piece of mechanical folly, it is now running six cars and two dummies, the cars seating nearly fifty passengers each, and fitted up in a style which is positively luxurious when compared with the ordinary horse-car. Two more cars of the same pattern as those now in use are about to be added to the equipment, and also two more dummies. The time from Dey street to the Hudson River Railroad depot, a distance of three miles, is a little less than twenty minutes. To travel as fast as this along our city thoroughfares is something wonderful, and some of our people are actually getting used to it, as may be inferred from the fact that as many as 2500 passengers have been carried in a single day.

As one sits inside the car, there is, on looking out of the window, a sense of elevation not altogether comfortable, and suggestive of possible mishaps. The car seems resting upon nothing, and one feels conscious of an unpleasantly long distance to fall in case of a breakdown. At each post which supports the superstructure there is a jump similar to that experienced on an ordinary train when the wheels pass the ends of the rails, and there is an apparent bending of the track between the posts which causes a slight feeling of insecurity. But the track structure is subjected to rigid inspection, and the officials are confident there is no real danger.

A further increase in the number of cars, with turnouts at proper distances along the line, will allow trains to be run more frequently and accommodate more passengers. We are told that this is contemplated, and that the success which has already attended the undertaking, has encouraged the proprietors to continue the road to the Harlem River. Work on the extension will probably be commenced in a few months.

Another project, called the Gilbert Elevated Railway, designed to run from High Bridge to Bowling Green, is already organized, and will be completed, it is said, during the present year. It will be an iron viaduct road, built in the most substantial manner, with steel rails, and constructed to carry 3000 pounds to the foot. It will be 24 feet above the street, with iron arches between the sidewalks. The posts supporting it will be 50 feet apart. The engines will consume their own smoke. Cars will follow one another at intervals of five minutes, and the stations will be half a mile apart. The cost of the structure is estimated at a million of dollars per mile.

What the Popular Taste Requires.

The reader will find on another page some comments by a contributor, upon the advantages and defects of car-construction, in which he suggests that a portion of the expenditure required for the elaborate finishing and fitting-up of the better class of passenger-cars might be more judiciously employed in other-ways better calculated to secure the comfort and safety of travelers. In view of the prevailing tendency toward excess in this direction, the suggestion is a good one, and should be duly heeded, especially by that portion of the traveling public whose passion for ornamental finery has not been subjected to wholesome discipline. We fear, however, that the time has not yet come for any retrograde movement in the matter of car-ornamentation. The tendency is rather the other way. Our people, as a rule, like richly furnished houses, churches, hotels, steamers, and railway-cars, and prefer to foot the bill rather than forego the gratification which such things afford. It may be a childish passion, and savor of vanity and ostentation somewhat, but it is a national trait characteristic of Young America, and can only be modified by time. Fifty years hence our standards of taste will probably be more chastened and display less fanciful exuberance. The rage for brown-stone fronts, black walnut, Mansard roofs, and flash jewelry, will have passed away to give place to other styles and methods, the outgrowth of a larger experience. As respects car-decoration, it will at all times reflect the popular feeling and conform to the requirements of popular taste. It is likely to be more rich, showy, and sumptuous before it becomes less so. The market determines the style of the wares that are taken to it. The railway companies keep traveling facilities to sell, and if a profusion of ornament, varnish, gilding, and carving will draw patronage, head off rivals, and swell the dividends, it will be provided without much regard to expense or mere utilitarian theories. Car-manufacturers aim to please their customers, and must meet the demand without criticising too severely the taste of the buyer. If a miniature palace is wanted, gorgeous with silken drapery and fragrant with Oriental per-

fume, it must be forthcoming, although in its progress over the rails it is liable at any moment to become a shapeless wreck, or fuel for the flames.

We think, however, that considerations of what is required for safety and substantial comfort are not by any means lost sight of by undue attention to ornament. This is manifest in the trial and testing of innumerable devices for improving the structure of cars, and the ready adoption and application of such as promise the best results, in diminishing liability to accident and increasing the efficiency of railway operation.

A Quadruple Track.

THE projected laying of another double track by the New-York Central Railroad is such a marked advance in the prevailing system of construction that, if it is carried into effect, it will be regarded in the future as one of the mile-stones of railway progress. The very great advantage of a quadruple track for a line of road burdened with such an immense traffic as the one above named, are apparent at a glance. We suppose the intention is to completely separate the passenger and freight traffic by devoting one pair of tracks exclusively to each. The benefits resulting from the practical operation of such a plan will doubtless be such as to induce, or rather compel, all leading competing lines to follow the example. The cost, to be sure, is considerable; but the ultimate return in increased carrying capacity, greater dispatch, diminished liability to accident, and more harmonious and systematic working of the operating machinery of the road, will more than remunerate for the outlay. The running of freight and passenger trains on the ordinary double track, especially on lines of heavy traffic, is only comparatively better than running them on one track. One is constantly interfering with the other, causing delay, vexation, collisions, and an incomputable pecuniary loss.

A four-track road from Albany to Buffalo will constitute a commercial artery indeed, of such magnitude and capacity, that if the original projectors of the Erie Canal could be permitted to institute a comparison between the two, they would acknowledge that a good deal of hard labor was wasted on the old ditch.

Car-Builders' Monthly Meeting.

IN accordance with a resolution adopted at the opening of the rooms of the Master Car-Builders' Association, at 111 Liberty street, in this city, fixing the time for holding social and business meetings, a number of gentlemen, including the committee on models and drawings, assembled at the rooms on Thursday evening, January 16th. Owing to the unfavorable weather and bad condition of the streets, the attendance was not as large as it otherwise would have been. A number of models were examined, and various matters pertaining to car-construction discussed in an informal way. At the next monthly meeting, which will be on the 20th of February, several new and interesting models will be submitted for examination, and it is hoped that members of the Association, and others connected with the mechanical departments of railroads who may be in the city, or within easy reach of it, will not fail to be present. These meetings, if well sustained can not be otherwise than instrumental in promoting the interests and objects of the organization.

A CAR belonging to the Chicago, Burlington, and Quincy Railroad, with a Doty & Miltimore compound axle, with independent wheels, has recently been running on the Harlem road with the view of showing the practical working of the new device. The car, although considered a common one out West, is far superior to first-class cars on Eastern roads. It has been to Boston, but is too high for the bridges on the New-Haven and Shore Line road. The train was taken round through Albany, and will go to Philadelphia and New-Orleans, *en route* for Chicago. The new invention is pronounced a success by competent judges, so says the New-York *Grocer*.

THE *American Artisan* begins the new year with a second enlargement of four pages, making the size of the paper sixteen pages in all. The editorial department has been reinforced by the accession of Mr. S. H. Wales, formerly editor of the *Scientific American*. The paper is beautifully printed and illustrated, and contains a great deal of information upon mechanical and scientific subjects interesting to every class of intelligent readers.

WE have received the first number of the *Railway Monitor*, a new monthly periodical published by Messrs. William B. Dana & Co., New-York, and devoted to general railroad intelligence. It contains 32 pages, and has wide double columns. The larger portion of this space is occupied with reviews of railroad reports, giving a concise but comprehensive and reliable exhibit of the condition of the various roads. The editorial department is well sustained, and there is also a summary of miscellaneous and current railway news. The whole is arranged, classified, and indexed, so that reference can readily be made to any particular item or subject. It promises to be an exceedingly valuable record of railway history and progress. Price, $4 per annum.

Miscellaneous Items.

THE National Locomotive-Works of Dawson & Bailey, at Connellsville, Pa., employ 120 men, and turn out at the rate of two engines per month. They are now completing a 20-ton engine of three-foot gauge, with cylinders 12 x 18 inches; driving-wheels, 50 inches; steel tire, steel crank-pins and brass pumps. They are the manufacturers of the Aristotle, considered the smallest engine in practical use in the United States, being 66 inches high and about 4 tons weight, and now running on a 24-inch gauge, being used by the Connellsville Gas Coal and Coke Co. This insect is able to pull 120 tons up a 160-feet grade. They also manufacture a larger class of engines for passengers and freight, from 17 to 24 tons in weight. The heavy freight-engines are built with 50-inch wheel, six wheels connected, and cylinders 14 x 22 inches. They make their own castings, and all wearing parts are either steel or case-hardened. The fire-boxes are of steel. The flue-sheets are ½ inch in thickness, the sides and end-sheets ⅝ in thickness. They are about completing an additional building, in which they will have all the machinery for hoisting and moving heavy weights, when they will employ 200 men and increase the production of the works to six engines per month.

THE Sacramento *Record* says that twenty cars are being fitted up at that place to carry meat between Humboldt and San Francisco. Racks are made with braced uprights at each end of the car, upon which rest long bars running the whole length, and having hooks on both sides to hang the meat upon. Fifty-four quarters of beef can thus be transported in one car.

THE shops of the Jacksonville, Pensacola, and Mobile Railroad, at Tallahassee, Fla., have recently turned an old, dingy, dilapidated passenger-coach into a new one, and named it the "Mobile." The prevailing color outside is yellow. The ends display some samples of decorative painting executed in a very artistic manner. The inside is furnished in imitation walnut and maple, relieved by gold trimmings. The old covering of the coach has been taken off and a central canopy raised on it, which is ornamented in a very tasteful manner. The panels contain landscape and marine scenes, which are very skillfully executed. The most significant feature about the car is that the resources of the shops have furnished every thing connected with it, with the exception of the brackets and lamps. It is the first attempt of the kind that has been made, and the effort reflects the highest credit on all concerned. The work has been accomplished, too, at a very small cost—only $700 having been spent on it, yet it is as well-furnished and substantial a passenger-coach as any of those for which the sum of $5,000 was recently paid.

THE Springfield *Republican* says that the door of one of the New-York and Boston passenger-cars wouldn't stay shut, the other night. One of the passengers went and slammed it shut, another carefully fastened it, and a third leaned a stick against it; but it was always wide open again by the time the experimenter got back to his seat. The thermometer was below zero, and the wind swept into that car like an avalanche of needles; flesh and blood couldn't stand it, and the passengers bemoaned themselves and took turns holding the door shut. Finally it was taken off the hinges and propped up, and at last the car was deserted and came into the city entirely empty.

THE Newark *Advertiser* says the New-Jersey Midland Railway Company own 2000 feet of river-front at Weehawken, with about fifty acres of land, which is to be the terminus for the freight business of the New-York Midland Road. To reach this terminus the company will commence the construction of a tunnel under Bergen Hill upon the opening of spring. It will be about 3500 feet in length, which is 800 feet shorter than the Erie tunnel. The estimated cost for this work is $600,000, and the tunnel will be completed in about two years. Along the river front are to be constructed extensive docks, warehouses, grain-elevators, etc., and the whole improvement, including the land and the cost of the tunnel, will be about $4,000,000.

MICHIGAN is said to have the largest saw-mill in the world. It is located in the Saginaw valley, four miles from Saginaw Bay, and opposite the flourishing town of Bay City. The main building is eighty by one hundred and forty feet in size, with slate roof. There are also several wings in which machinery for the manufacture of lath and staves is placed. All parts of the immense establishment are lighted with gas. The mill began operations in 1865, and since that time has manufactured 180,153,927 feet of lumber, giving employment to three hundred men. In one day it cut 370,797 feet of lumber, a feat which has never been equaled.

THE new round-house of the Chicago, Danville, and Vincennes Railroad, at Danville, is now very nearly completed. It is of brick, on a radius of 130 feet, and has stalls for 12 locomotives. The company have recently completed a machine-shop in Danville, 140 x 73 feet, for which the machinery has been purchased, and will shortly be put in. The new car-shop at the same place is almost finished. The new round-house in Chicago, at the corner of Douglas street and Western avenue, is almost completed. It will be similar to the one at Danville.

THE fact that the Michigan Central Railroad company have purchased, during the past year, 16,000 tons of steel rails, one half of which were used in laying eighty-two miles of new double-track and the balance in removals and repairs, but shows how steadily and fast that improved material is taking the place of iron for that purpose. The company has expended for the year about three millions of dollars in improve ments

ONE of the most important of the railway consolidations recently consummated is the lease by the Chicago, Burlington, and Quincy Company of the Burlington and Missouri River Railroad, extending through Iowa to the Missouri. This matter has been the subject of considerable discussion and speculation for some time, and is now finally settled. The new arrangement took effect with the New Year.

MR. A. T. STEWART'S Central Railroad of Long Island, from Hunter's Point to Hempstead, was recently opened. The cars are handsome and commodious, more so, perhaps, than those of any other road; they are lighted with candles instead of kerosene, and supplied with patent couplers and steam brakes. The road is laid with steel rails.

OWING to the crowded condition of the shops of the Harrisburg Car Manufacturing Company in the upper section of that city, the company has been compelled for several weeks past to send many partially completed cars to their branch works on Allison's Hill, where they receive the finishing touches.

THE new cars which are run on most of the Erie Railway local trains are provided with ventilators in each end over the doors, like those in street-cars. The cars are more perfectly ventilated by them than by any means heretofore devised—if they are open. When they are shut the cars are simply air-tight boxes, as there are no side ventilators such as were formerly used. The conductors and brakemen are strongly opposed to having the ventilators open, and they are placed so high above the floor as to be out of reach and beyond the control of the passengers, some of whom, however, may not be aware that they are suffering from foul air or where a remedy is to be found.

THE Pennsylvania Railroad has placed ten new Altoona locomotives on the New-Jersey lines, two of them on the Amboy division. The Jersey City depot is to be enlarged to 1200 by 800 feet, and the six tracks in it made twelve.

THE paint and blacksmith shops of the Adrian Car Company, of Adrian, Mich., were totally destroyed by fire December 27th. Two first-class coaches, building for the Atchison and Nebraska Railroad, and four second-class coaches and one baggage-car, intended for the Milwaukee and Northern Railroad, were destroyed. The fire was caused by the carelessness of two boys, who flirted naphtha, with which they were cleaning their brushes, within reach of the flames of an oil lamp. The exertions of the fire department were wholly directed toward preventing the fire from spreading to other buildings, and in this they were successful. The company's loss is about $75,000, with little or no insurance. The shops will be rebuilt immediately.

THE forward driving-axle of a locomotive running on the Iowa division of the Illinois Central Railroad recently broke in two places, and both forward wheels went rolling into the ditch. The right hand back cylinder-head was broken, the guides sprung, the rods broken on both sides, and the cab badly damaged.

THE Cleveland and Pittsburg Railroad not only provides racks for Bibles furnished by the American Bible Society, but it allows no light or vicious literature to be sold on its cars. Nor does it stop even here. It does not allow its employees to shock the ears of its patrons by the use of profane language.

THE Harrisburg (Pa.) *State Journal* says that a freight train consisting of four locomotives and 128 eight-wheel cars left that place about 6 o'clock on the morning of December 15th, on the Pennsylvania Railroad, and reached Altoona the same afternoon. The train was considerably over half a mile long.

THE cars on the Germantown and Norristown branch of the Philadelphia and Reading Railroad company hereafter will be lighted with ordinary gas, supplied to the tanks from the pipes laid alongside the track.

A COMPANY with a capital of $500,000 has been organized to build a new union depot at Columbus, O., to accommodate all the railroads which enter that city. The building will be 200 by 600 feet.

THE Wason Car Company, Springfield, Mass., are at work on a contract for fifty cars for a single road. They have just shipped a couple of passenger-cars, painted "Chinese vermilion," for the Missouri, Kansas, and Texas Railroad.

MR. J. G. BUTTERFIELD, Master Mechanic of the St. Paul and Sioux City Railroad, has resigned his position. Mr. Butterfield has purchased a large tract of wheat-land, and intends to engage in farming.

MR. GEORGE H. GRIGGS, who lately resigned his position as MasterMechanic of the Flushing and North-Side Railroad, did so in order to take charge of a private manufacturing establishment.

THE Pullman Palace-Car Company are providing their sleeping-cars with safes, in which travelers can deposit their valuables. Another item to the dead weight.

A NEW locomotive, named the Anthracite, which has been placed on the Albany and Susquehanna Railroad, has six driving-wheels and carries its water above the boiler. A tender is thus dispensed with. The firing apparatus is stated to be so arranged that the fires last all day without replenishing, and the furnaces only require dumping once a week.

MR. HENRY SCHLACKS, recently foreman of the Rock Island Railroad shops, has been appointed master-mechanic of the Chicago Division of the Illinois Central Railroad, *vice* George Holton, resigned. Mr. Schlacks was formerly apprentice in the shops of which he now has the control. His present position has been worthily attained.

THE car department of the new machine-shops of the St. Louis, Kansas City, and Northern Railway, at Moberly, are capable of completing three freight-cars daily, and the company expect to build their own passenger-cars equal to the best.

JOHN W. GARRETT has been unanimously re-elected to a fifteenth term as President of the Baltimore and Ohio Railroad.

THE car-shops of the Lebanon Manufacturing Company, at Lebanon, Pa., were burned on the 6th of January. The fire was the work of an incendiary.

The Pullman Palace-Car Company.

THIS company is fitting up a building in Chicago, on the corner of Michigan Avenue and Adams street, to be used for their general offices. The basement will be occupied by the upholstering department. A room 120 feet long by 90 wide, on the first floor, will be used as headquarters for the commissary department, general store-keeper and purchasing agent, and will be the general supply depot of the company for the Middle and Western departments. The stock to be kept here will consist of the interior equipment of cars, embracing all the material and fixtures used for that purpose. The second floor will be occupied by the president, first vice-president, general superintendent, cashier, and secretary, and will all be entered from a spacious hall extending the entire length of the building. The third and fourth floors will be occupied by other offices, and on the last-named floor there will also be a restaurant and rooms for the employees. The restaurant consists of a kitchen 12 by 18 feet and a dining-room 14 by 18 for employees, and another 16 by 18 for the officers and heads of departments. One object of the restaurant is to furnish a cheap and convenient place for the working force of the company, within the building, to get their dinners, and to cultivate a society, as it were, among the employees which shall be productive of harmony and good feeling, while it will interest them more in the work for which they are employed. The kitchen is to be fitted with a cooking-range and all the various devices used in the culinary department of the palace dining-cars. It will receive fresh air and light from windows on Adams street and a sky-light in the roof, so that no offensive odors from meats shall impregnate the air of the building. The dining-rooms are to be fitted with that style of ornamentation peculiar to the cars of the Pullman company.

There are also a library and sitting-rooms designed to be used by conductors and others, the managers believing that whatever tends to make the headquarters of the company attractive to the employees has the effect to make them more useful, and this library and reading-room will be fitted up in the hope that it may induce the men to spend their leisure hours under the influences of good books and pleasing literature. The family-room is to be a place where the employees shall meet on a common footing, and spend a day or evening now and then, when off duty.

Across the hall from these rooms, a row of bath-rooms is located, to be used by employees who run upon the road. The men are to report to the heads of their departments as soon as they arrive in the city, after which, if necessary, they have the privilege of the bath-rooms.

The company have decided to commence, at once, the erection of extensive repair-shops at Jersey City, New-Jersey, and St. Louis, Mo. But these are to be insignificant compared to the car-works the company have decided to build in Chicago. These are to be the principal works of the company, and the only shops where the palace-cars are to be constructed.

The Sickels Air-Brake.

THE Chicago *Railway Review* contains the following description of a new atmospheric railway brake, invented by Mr. T. E. Sickels, chief engineer and superintendent of the Union Pacific Railroad, and designed to remedy some of the objections to the Westinghouse contrivance, and especially the use of the air-pressure to *apply* the brake.

Mr. Sickels, in his apparatus, uses a spring to apply the brake, and air-pressure *to take it off*. The apparatus is thus, in principle substantially, the same as the Westinghouse, with the exception of the spring; a Creamer spring is used on each car to apply the brake. The power of the spring is definitely known; and the pressure being limited by its power, it is always known precisely what pressure is applied. The normal condition of the train is with all the brakes applied by action of the springs. If the engineer wishes to *start* the train, he lets on the air-pressure, which detaches the spring and leaves the wheels free to move; the pressure is kept upon the pipes, and so long as this is done, the brakes are kept released. To *apply* the brakes, a portion of the whole of the condensed air in the pipe is let off, and the action of the springs applies the brakes. If there be any defect in the connecting-pipe, the result can not be serious, the only effect being that the train can not be started, and the engineer must stop and repair the pipe, and re-establish the air-pressure before the wheels can run. In the Westinghouse apparatus the engineer has to find out defects by trying to *stop*, instead of *start* the train, and the knowledge may have to be obtained at fatal cost. Suppose, with the Sickels apparatus, that the train breaks in two, the break lets the air out of the pipes, the springs apply themselves to each car, and the entire train is brought to rest.

Furthermore, Mr. Sickels has aimed to put the entire train under the instant control of either the conductor or the engineer. By having a cock in each car leading to the air-pipe, the conductor—an accident having occurred to any portion of the train—can apply the brake from *any* car to the *entire* train; and this he can do as gradually or suddenly as he pleases, by regulating the discharge of the air from the pipe. As the inventor states it, the excellencies of the Sickels apparatus may be thus summarized: it is impossible to slide the wheels; the brake is automatic in case of a break in the train; the conductor (or a brakeman or passenger, for that matter) can apply it, and the train can not be run unless the apparatus is in order.

IT is estimated that during the last year, the New-York City horse-cars carried one hundred and twenty-five millions of passengers, of whom forty millions rode two miles or more, wasting at least thirty minutes' time each trip more than would be required by a rapid transit railway.

MR. GEORGE W. PERRY has resigned his position as master car-builder of the Philadelphia, Wilmington, and Baltimore Railroad, and has removed to Boston. Mr. S. A. Hodgman, the present master-mechanic, is his successor.

AN inquiring man thrust his fingers into a horse's mouth to see how many teeth he had. The horse closed his mouth to see how many fingers the man had. The curiosity of each was fully satisfied.

Publishers' Notices.

Paints and Colors for Railway Cars and Coaches.

We desire to call the attention of car-builders to the advertisement of Messrs. C. P. Raynolds & Co., which will be found on page 40. This firm ranks among the oldest business houses in the city, its original organization dating as far back as 1770, from which time until now it has been engaged in the manufacture of paints and colors. During this long period the business has been greatly extended and developed to meet the requirements of modern progress in artistic embellishment. The firm supplied paints for the decoration of the mail-coaches of a former day, and they are now able, by their long experience and familiarity with the wants of their customers, to supply coach colors of the finest quality and of every shade, and especially adapted to car and locomotive ornamentation. The firm also manufacture superior varnishes and a variety of articles incidental to the trade, a full supply of which is always kept in stock at their warerooms, 106 and 108 Fulton street. The dealings of the firm are characterized by careful attention to the wants of customers, and promptness in executing orders, their aim being at all times to satisfy their patrons. The result has been a large, steadily increasing, and successful business.

Wood-working Machinery.—Messrs. First & Pryibil, West Fortieth street, corner of Tenth avenue, manufacture a great variety of this class of machinery, and of the latest and most improved construction, including turning-lathes, sawing, moulding, boring, and mortising machines; also shafting, pulleys, and hangers. We desire to mention more particularly an improved machine for making hard-wood mouldings, which does the work so perfectly as to dispense with sandpapering; also, an endless band-saw machine, which is a great improvement on the scroll saw, and which also may be used instead of a circular saw. The heaviest of these machines will saw hard or soft wood 18 inches thick, and can be made to saw bevel as well as square. The establishment also manufactures an oval turning-lathe which does away with the strain which ordinarily takes place in turning particular parts of the oval, and consequently the lathe can be run at a greater speed, with an improvement in the quantity and quality of the work produced. The attention of car-builders is directed to Messrs. First & Pryibil's advertisement on third page of cover.

Railway Supplies.—Messrs. Vose, Dinsmore & Co. have established, in connection with their car-spring business, a department of general railway supplies, and are now prepared to execute orders for material in that line, including upholstery goods, plain and embossed imported plushes of superior quality, bronze and other car-trimmings of the latest and most approved patterns, locomotive head-lights, steam-gauges etc., etc. The usual variety of railway car-springs kept in stock or manufactured to order at the shortest notice. Steel rails and locomotive tires of approved quality also supplied. See advertisement on page 47.

Hitchcock's Car-Ventilator.—We again call attention to this excellent device for the ventilation of railway passenger-cars, which has already been adopted by various roads in different parts of the country, and, so far as we can learn, it has received the unqualified approval of railroad men and the traveling community. A clear idea of its construction can better be obtained from a model, or the ventilator itself; but the method of its working can be understood by referring to the description and accompanying cuts in the advertisement on page 26. The proprietors are H. D. Carroll & Co., Springfield, Mass.

An Iowa man can not remember where he hid a coffee-pot full of silver, during the war, and has scratched nearly every hair out of his head thinking about it.

Johnny Bartholomew's Dash.

[As the passenger train from Reno to Virginia City, Nevada, on the Virginia and Truckee Railroad, October 17th, rounded the curve near the American Flat, loaded with passengers, among which were many women and children, and with "Number Six" train thundering along close behind, the timbering in the tunnel was discovered to be on fire. The engineer, Johnny Bartholomew, comprehending the position at a glance, made one of the most brilliant dashes under the circumstances on record. The train passed through the tunnel safely, when to have stopped short would have been sure death. We say, *Honor the brave engineer.*]

I an't very much on the fancy,
And all that sort of stuff,
For an engineer on a railroad
Is apt to be more "on the rough;"
He don't "go much" on "his handsome,"
I freely "acknowledge the corn;"
But he has to "git up" on his "wide-awake,"
That's "just as sure's you're born."

Now I'll tell you a little story
'Bout "a run" we made for our necks,
When we thought "Old Gabe" had called us
To "ante up our checks."
We came round the curve by the tunnel,
Just beyond the American Flat,
When my fireman sings out "Johnny!
Look ahead! My God! what's that?"

You bet I warn't long in sightin'—
There was plenty for me to see,
With a train full of kids and wimmen
And their lives all hangin' on me;
For the tunnel was roarin' and blazin',
All raging with fire and smoke,
And "Number Six" close behind us;
"Quick, sonny! shove in the coke."

"Whistle down breaks," I first thought;
Then thinks I, "Old boy, 'twon't do,"
And with hand on "throttle" and "lever,"
I knew I must *roll 'em through!*
Through the grim mouth of the tunnel,
Through smoke and flame as well,
Right into the "gateway of death," boys;
Right smack thro' the "jaws of hell!"

The staunch "old gal" felt the pressure
Of steam through her iron joints;
She acted just like she was human,
Just like she "knew all the points;"
She glided along the tramway
With speed of a lightning flash,
With a howl assuring us safety,
Regardless of wreck or crash.

I s'pose I might have "jumped the train,"
In hope to save sinew and bone,
And left them wimmen and children
To take that ride alone.
But I thought of a day of reck'nin';
And whatever "Old John's" done here,
No Lord an't going to say to him then,
"You *went back* as an engineer!"

G. H. Jennings.

Facetiæ.

"I shay, driver," said a top-heavy passenger who had tumbled from the upper deck of a stage-coach, "we had a pretty bad upshet, didn't we?" "Upset! We haven't upset," replied the driver. "Yesh we did upshet. I shay we did upshet," insisted top-heavy. "I'll leave it to this gemmelman if we didn't upshet." The umpire decided against him, whereupon with a solemn look and a moment's meditation he responded, "I shay, driver, if I had known we didn't upshet, *I wouldn't ar got off.*"

A gentleman recently came down a long and steep stairway in a very irregular and promiscuous manner, sideways, endways, heels over head and head over heels, conveying the impression to the passers-by on the side-walk that he was a first-class subject for surgery and a hospital. He very composedly gathered himself up, however, and addressing the amused and astonished bystanders, said, "What'n thun'er yer laffin at? That's way I allus come down!"

"What do you call that?" indignantly asked a customer in a cheap restaurant, pointing at an object that he had discovered in his plate of hash. "Wristband with sleeve button attached, sir," said the waiter briskly. "Well, do you consider that a proper thing for a man to find in his hash?" asked the customer in wrath. "Good heavens, sir!" cried the waiter, "would you expect to find a ten-dollar silk umbrella in a fifteen-cent plate of hash?"

A rusty-looking agriculturist entered a newspaper office recently, and after looking around earnestly enough to elicit an inquiry as to his business, said, "It wasn't nothin' much; but he had left a big cucumber here in the fall for a notice, and thought, as how he was in town, he might run in and get it, if he was through with it."

An Indiana man, who applied to the administration for the position of minister to Russia, closed his letter by saying, "If you can't give me that posish, I would have no objection to being appointed hostler in some warm stable where I could boss two or three boys, as I love the horse and have considerable executive ability."

An Illinois unstamped letter, dropped in the Springfield post-office, was recently forwarded, as usual, by the Young Men's Christian Association, and reached its destination. On being opened, it was found to contain the following: "Send me another barrel of that gin."

A lady made a complaint to Frederick the Great, King of Prussia: "Your Majesty," said she, "my husband treats me badly." "That's none of my business," replied the king. "But he speaks ill of you," said the lady. "That," replied he, "is none of your business."

Here is a good business-like epitaph: "Here lies Jane Smith, wife of Thomas Smith, marble-cutter. This monument was erected by her husband as a tribute to her memory and a specimen of his work. Monuments of the same style, $250."

People who believe the current stories about intelligent dogs will read with pleasure that a lost dog in Norfolk, having seen his master's advertisement in one of the local prints, promptly went home.

"If there is any body under the canister of heaven that I have in utter excrescence," says Mrs. Partington, "it is the slander going about like a boy constrictor, circulating his calomel upon honest folks."

A lover concluded a letter to his girl as follows: My best loved one, I chawed the postage-stamp on your last letter all to thunder, 'cause I knew you licked it on.

A toper sneered at a young man for wearing spectacles, when the latter said, "It is better to use glasses over the nose, as I do, than under the nose, as you do."

A Western paper, with peculiar standards of value, says that potatoes are one cigar and a drink of whisky per bushel at Davenport.

A man out West is so bow-legged that his tailor is obliged to use a circular saw in cutting out his pantaloons.

Never smoke in the car where there are ladies. Get the conductor to turn the ladies out before lighting your cigar.

Never use profane language in the car. Go on the platform. Profanity is never thrown away on a brakeman.

CHARCOAL ROOFING PLATES,

Russia Sheet Iron,

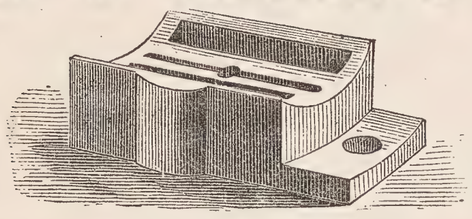
AND ALL METALS NECESSARY FOR

Car and Locomotive Works.

A. A. THOMSON & CO.,

213 and 215 Water Street, New-York

G. W. W. STEVENS & CO.,



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"STAR METAL,"

And manufacturers of other Railway Journal Bearings, and general Brass Founders and Finishers,

95 Liberty Street, New-York City

D. S. STEVENS, *Manager.*

INSURE AGAINST ACCIDENTS

IN THE

TRAVELER'S INSURANCE CO.,

OF HARTFORD, CONN.

Master Mechanics and Master Car-Builders who pay $10 are insured against all kinds of accidents to the amount of $1000 in case of death, or if disabled, draw $5 a week for 26 weeks.

Apply to **L. F. DINSMORE, Agent,**

Box 4055.

GET THE BEST!

CHARLES D. THUM,

No. 150 North Third Street,

PHILADELPHIA, PA.,

SOLE MANUFACTURER OF THE

Half Elastic Varnish Brushes

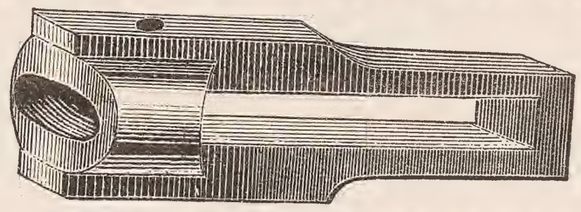
SUPERIOR TO ANY IN USE.

BRUSHES OF EVERY DESCRIPTION

On Hand, and Made to Order.

SEND FOR CIRCULAR.

ROSS & ARTHUR,



PATENT WROUGHT-IRON

DRAW-BAR-HEAD AND BUMPER

FOR RAILWAY CARS.

The head is welded to the bar instead of rivetting, which makes it more durable and stronger, and a great saving to any Railroad Company in repairing drawheads, as not one of our plan will be broken where fifty of the ordinary kind will fail. Any wrought-iron bar that can be repaired at all, can be changed to the Ross & Arthur Patent, and at a cost as low as to repair the old style of bar. Rights for sale to car manufacturers and railroad companies. For further particulars address the Patentees, ALEX. ROSS & JOHN ARTHUR, Freeport, Ill., P. O. Box 590; or, VOSE, DINSMORE & CO., No. 1 Barclay Street, New-York City.

LUNT & LEE,

SUCCESSORS TO

LUNT, DE FORD & LEE,

IMPORTERS AND JOBBERS OF

Railway Car and Carriage

LININGS,

Plushes, Cloths, Carpets, Satins, Curtain Silks, Cotelines, etc.,

99 CHAMBERS STREET,

CORNER OF CHURCH, **NEW-YORK.**

PHELPS, DODGE & CO.,

Cliff St., between John and Fulton,

NEW-YORK,

IMPORTERS AND DEALERS IN

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OF ALL SIZES AND KINDS.

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Are now used by some of the most extensive Railroads in the country, and are particularly recommended.

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SEND FOR CATALOGUES AND PRICE-LISTS.

Car Manufacturers.

Allison, W. C. & Sons	Philadelphia, Pa.
Anderson, J. R. & Co	Richmond, Va.
Altoona Manufacturing Co	Altoona, Pa.
Adrian Car Co	Adrian, Mich.
Arlington Car Manufacturing Co	Arlington, Vt.
Atlantic Car Works	Salem, Mass.
Barney & Smith Manufacturing Co	Dayton, Ohio.
Baker, Jackson & Co	Latrobe, Pa.
Billmeyer & Smalls	York, Pa.
Bradley, Osgood	Worcester, Mass.
Bridgeport Car Works	Bridgeport, Pa.
Brill, J. G. & Son	Philadelphia, Pa.
Bitner, George W	Pittsburg, Pa.
Buffalo Car Co	Buffalo, N. Y.
Canada Car Co	Toronto, Canada.
Canda, F. E. & Co	Chicago, Ill.
Canada Steam-Engine Co	Kingston, Canada.
Cartersville Car Co	Cartersville, Ga.
Central Car & Manufacturing Co	Jackson, Mich.
Clendenning, W. W	Montreal.
Cummings Car-Works	Jersey City, N. J.
Connellsville Machine and Car Co	Connellsville, Pa.
Corunna Car Co	Corunna, Mich.
Detroit Car and Manufacturing Co	Detroit, Mich.
Detroit Car Works	Detroit, Mich.
Dawson Manufacturing Co	Dawson, Ga.
Dickey, Neill & Co	Toronto.
Dickson Manufacturing Co	Scranton, Pa.
Erie Car-Works	Erie, Pa.
Elmira Car-Works	Elmira, N. Y.
Fredericks & Co	Catasauqua, Pa.
Freas Brothers & Thornton	Berwick, Pa.
Fremont Car Co	Fremont, Ohio.
Gardner, F. & Co.	Carlisle, Pa.
Gill, John L	Columbus, Ohio.
Gilbert, Bush & Co	Troy, N. Y.
Goold, James & Co	Albany, N. Y.
Goodrich Car Co	Augusta, Ga.
Haskell & Barker	Michigan City, Ind.
Harrisburg Car Manufacturing Co	Harrisburg, Pa.
Heathcote, Herbst & Co	Glen Rock, Pa.
Hamilton, William & Son	Toronto.
Harlan & Hollingsworth Co	Wilmington, Del.
Indiana Car Co	Cambridge City, Ind.
Indianapolis Car Co	Indianapolis, Ind.
Jackson & Sharp Co	Wilmington, Del.
Jackson & Woodin Manufacturing Co	Berwick, Pa.
Jones, J. M. & Co	West-Troy, N. Y.
Kimball Manufacturing Co	San Francisco, Cal.
Keith, H. T. & I. N	W. Sandwich, Mass.
Laporte Car Manufacturing Co	Laporte, Ind.
Lombard, Thomas	Augusta, Me.
Lebanon Manufacturing Co	Lebanon, Pa.
Lehigh Car Manufacturing Co	Stemton, Pa.
Litchfield Car Manufacturing Co	Litchfield. Ill.
Stephenson, John & Co	New-York, N. Y.
Michigan Car Co	Detroit, Mich.
McNairy, Claflen & Co	Cleveland, Ohio.
Murray, Dougall & Co	Milton, Pa.
McVay, Walker & Co	Braddock's Field, Pa.
Mowry Car and Wheel Works	Cincinnati, O.
Middletown Car & Manufacturing Co	Middletown, Pa.
Missouri Car and Foundry Co	St. Louis, Mo.
New-Haven Car Co	New-Haven, Ct.
Niblo, James M	Conshohocken, Pa.
Ohio Falls Car Co	Jeffersonville, Ind.
Ontario Car Co	London, Ont.
Patten Car Works	Bath, Maine.
Peabody & McDonald	Calais, Me.
Peters, Simon	Quebec.
Pittsburg and McKeesport Car Co	McKeesport, Pa.
Pittsburg Car and Locomotive Co	Pittsburg, Pa.
Portland Co	Portland, Me.
Pullman Car Co	Chicago.
Peregoy, J. H	Houston, Texas.
Quealy Car & Iron Works	Hannibal, Mo.
Ranlet Car Manufacturing Co	Laconia, N. H.
Russell & Co	Massillon, Ohio.
Sands, William L	Pottstown, Pa.
Schoharie Machine Co	Schoharie, N. Y.
Schall, Michael	York, Pa.
Shaaber & Johnston	Reading, Pa.
Southern Car-Works	Independence, La.
South-Western Car Co	Jeffersonville, Ind.
Shoenberger & Bryant	Duluth, Minn.
Seath & Hager	Terre Haute, Ind.
Taunton Car Co	Taunton, Mass
Tredegar Co	Richmond, Va.
Tiffin Car-Works	Tiffin, Ohio.
Vigo Foundry and Terre Haute Car-Works	Terre Haute, Ind.
Wharton, Thomas J	Brunswick, Ga.
Whittaker, Phillips & Co	Toledo, Ohio.
Wason Manufacturing Co	Springfield, Mass
Weimer, P. L. & Bros	Lebanon, Pa.
Wyoming Valley Manufacturing Co	Wilkesbarre, Pa.
Wells, French & Co	Chicago, Ill.
Wilmington Car-Works	Wilmington, Del.

Car-Wheel Manufacturers.

Albany Car-Wheel Works	Albany, N. Y.
American Paper Car-Wheel Co	Pittsford, Vt.
Atlantic Iron-Works	Portsmouth, Va.
Baltimore Car-Wheel Foundry Co	Baltimore, Md.
Barnum & Richardson Manufacturing Co	Chicago, Ill.
Barney & Smith Manufacturing Co.	Dayton, Ohio.
Bass & Hanna	Fort Wayne, Ind.
Bailey, Howson & Co	St. Paul, Minn.
Boston Car-Wheel Co	Camb'gep't, Mass.
Bowler, Mayer & Brayton	Cleveland, Ohio.
Davenport, Fairbairn & Co	Erie, Pa.
Dawson Manufacturing Co	Dawson, Ga.
Detroit Car-Wheel Works	Detroit, Mich.
Fulton Foundry Co	Cleveland, Ohio.
Gill & Bidwell	Allegheny City, Pa.
Green, D. P. & Co	St. Louis, Mo.
Hamtramck Car-Wheel Works	Detroit, Mich.
Harrisburg Car Manufacturing Co	Harrisburg, Pa.
Heartt, Jonas S. & Co	Troy. N. Y.
Jackson & Woodin	Berwick, Pa.
John L Gill	Columbus, Ohio.
Lobdell Car-Wheel Works	Wilmington, Del.
Louisville Car-Wheel & Railway Supply Co	Louisville, Ky.
Middlebrook & Mack	Oswego, N. Y.
Missouri Car and Foundry Co	St. Louis, Mo.
Moore Elastic Car-Wheel Co	Jersey City, N. J.
Mowry Car and Wheel Works	Cincinnati, Ohio.
Ohio Falls Car Co	Jeffersonville, Ind.
Pettengill, Glass & Co	Cleveland, Ohio.
Quealey, W. J	Hannibal, Mo.
Ramapo Wheel & Foundry Co	Ramapo, N. Y.
Rutland Foundry & Machine Co	Rutland, Vt.
Sterling Car-Wheel Foundry	Columbus, Ohio.
Scoville, J. & N. C	Buffalo, N. Y.
St. Louis Car-Wheel Co	St. Louis, Mo.
Taylor Iron Works	High Bridge, N. J.
Thompson, Duglas	Bordentown, N. J.
Tredegar Company	Richmond, Va.
Toronto Car-Wheel Co	Toronto, Can.
Washburn, Hunts & Co	Jersey City, N. J.
Washburn Car-Wheel Manufacturing Co	Worcester, Mass.
Wason Manufacturing Co	Springfield, Mass.
Whitney A. & Sons	Philadelphia. Pa.
Woodbury & Company	E. Cambr'ge, Mass.
Wyoming Valley Manufacturing Co	Wilkesbarre, Pa.

Locomotive Builders.

Baldwin Locomotive Works	Philadelphia, Pa.
Brooks Locomotive Works	Dunkirk, N. Y.
Danforth & Cooke	Paterson, N. J.
Dawson & Baily (light locomotives)	Pittsburg, Pa.
Dickson Manufacturing Co	Scranton, Pa.
Grant Locomotive Works	Paterson, N. J.
Hinckley & Williams	Boston, Mass.
Manchester Locomotive Works	Manchester, N. H.
Mason, William	Taunton, Mass.
McKay Iron and Locomotive Works	Jersey City, N. J.
Portland Company	Portland, Me.
Porter, Bell & Co. (light locomotives)	Pittsburg, Pa.
Pittsburg Locomotive Works	Pittsburg, Pa.
Rogers Locomotive Works	Paterson, N. J.
Rhode Island Locomotive Works	Providence, R. I.
Schenectady Locomotive Works	Schenectady, N. Y.
Taunton Locomotive Works	Taunton, Mass.

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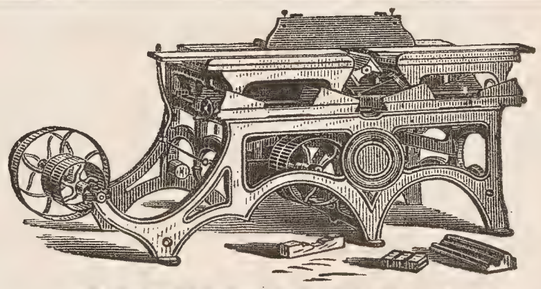

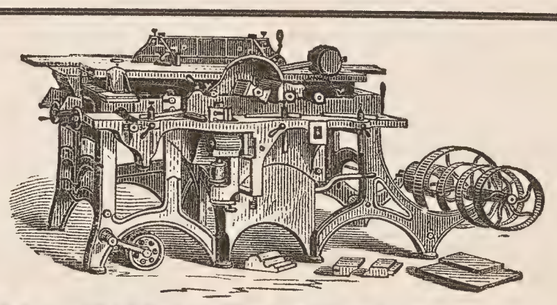

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A

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Arkansas Central	G. H. Bristol	G. H. Bristol	Helena, Ark.
Alabama Central	E. M. Smith	E. M. Smith	Selma, Ala.
Albany & Susquehanna	R. C. Blackall	R. C. Blackall	Albany, N. Y.
Alexandria & Fredericksburg			Alexandria, Va.
Alexandria, Nebraska & Iowa	Geo. Q. Adams		Alexandria, Mo.
Atchison, Topeka & Santa Fee	H. V. Farris		Topeka, Kans.
Atchison & Nebraska	Ira Petrie		Atchison, Kan.
Alabama & Chattanooga	S. W. Tozer	S. W. Tozer	Chattanooga, Tenn.
Atlanta & West-Point	Wm. Rushton		Atlanta, Ga.
Atlanta & West-Point	R. D. Cole	R. D. Cole	Newnan, Ga.
Atlantic & Gulf	C. E. Van Vorst	P. N. Raynal	Savannah, Ga.
Atlantic & North-Carolina	E. J. Clayton	E. J. Clayton	New-Berne, N. C.
Atlantic & Great Western	‡John Van Vechten	††J. H. F. Wiers	Meadville, Pa.
Atlantic & Great Western	William Fuller	D. S. Dockstader	Meadville, Pa.
Atlantic & Great Western	N. Wright	W. G. Haggard	Cleveland, Ohio.
Atlantic & Great Western	‖J. B. Miller.	S. V. Smith	Kent, Ohio.
Atlantic & Great Western	Allen Cook	J. W. Holmes	Galion, Ohio.
Atlantic & Pacific	§John Hewitt	John Hewitt	St. Louis, Mo.
Atlantic, Mississippi & Ohio			
Norfolk & Petersburg Division	J. S. Whitworth	J. S. Whitworth	Norfolk, Va.
South-Side of Virginia "	J. T. Robinett	J. T. Robinett	Petersburg, Va.
Virginia & Tennessee "	F. Sterk	W. A. Morgan	Lynchburg, Va.
Virginia & Kentucky "			
Allegheny Valley	G. W. Glass	R. Gunning	Pittsburg, Pa.
Androscoggin	Ira K. Russell	C. S. Greenwood	Farmington, Maine.
Adirondack			Saratoga, N. Y.

B

Baltimore & Ohio	§John C. Davis	J. S. Shryack.	Baltimore, Md.
Baltimore & Ohio		James H. Miller	Baltimore, Md.
Baltimore & Ohio	Wm. Edwards		Martinsburg, Va.
Baltimore & Ohio	A. J. Cromwell		Piedmont, Va.
Baltimore & Ohio	E. W. Lippencott		Grafton, W. Va.
Baltimore & Ohio			Wheeling, W. Va.
Central Ohio Division	Alex. Platt		Zanesville, Ohio.
S'dusky, Mans., & New'k Div.	Wm. Y. Johnson		Sandusky, Ohio.
Bangor, Old Town & Milford	J. B. Peckham	John H. Brown	Bangor, Maine.
Bellefonte & Snow Shoe	H. D. Landis	H. D. Landis	Bellefonte, Pa.
Belvidere Delaware	R. McDowell	John Silvers	Lambertville, N. J.
Boston & Albany	Wilson Eddy	F. D. Adams	Springfield, Mass.
Boston & Albany	A. B. Underhill	W. E. Chamberlain	Allston, Mass.
Boston & Providence	George Richards	John Lightner	Roxbury, Mass.
Boston, Clinton & Fitchburg	John Webster	Samuel Stevens	Fitchburg, Mass.
Boston, Concord & Montreal	R. Adams	M. R. Elkins	Lake Village, N. H
Boston & Maine	F. A. Waitt		Boston, Mass.
Boston & Maine		D. C. Richardson	Lawrence, Mass.
Boston, Lowell & Nashua	L. R. Winslow		Boston, Mass.
Boston, Lowell & Nashua		S. A. Davis	Nashua, N. H.
Blossburg & Corning	O. C. Patchell	O. C. Patchell	Corning, N. Y.
Brockville & Ottawa	Joseph Cockfield	Joseph Cockfield	Brockville, Can.
Blue Ridge			Anderson, S. C.
Burlington & Missouri River	G. Chalender.	G. Chalender.	Burlington, Iowa.
Burlington & Missouri River	J. Christiansen		Plattsmouth, Neb.
Burlington, Cedar Rapids & Minn	R. W. Bushnell		Cedar Rapids, Iowa.
Buffalo, New-York & Phila	Allen Vail	Chas. Burchard	Buffalo, N. Y.
Boston, Hartford & Erie	Geo. E. Boyden	Elias E. Pratt	Boston, Mass
Buffalo, Corry & Pittsburg	Thomas Connell	Thomas Connell	Corry, Pa.
Buff. Bayou, Brazos, Colorado		M. Borst	Harrisburg, Tex.

C

California & Pacific	O. R. Ford	D. Rutherford	Vallejo, Cal
Camden & Amboy	F. B Stevens T. T. Kerr Thomas Single	E. Lockwood	Hoboken. Bordentown, N. J. South-Amboy.
Camden & Atlantic	E. Collings	S. Wills	Camden, N. J.
Canada Southern	C. E. Benton	C. E. Benton	St. Thomas, Canada.
Catawissa	A. J. Prescott	G. P. Fenstermacher	Catawissa, Pa
Cape Cod	E. A. Walker	William Cannon	Hyannis, Mass.
Catasauqua & Fogelsville	Thomas Evans	Chas. J. Holbach	Catasauqua, Pa.
Carrolton & Oneida	M. T. Wiggins		Carrolton, Ohio.
Charleston & Savannah	H. T. Calder		Charleston, S. C.
Chesapeake & Ohio	W. G. Freeman	J. N. King	Richmond, Va.
Chesapeake & Ohio	T. J. Hamer		Huntingdon, W. Va.
Cheraw & Darlington	D. W. Haines	A. M. Corrie	Florence, S. C.
Champlain Trans. Co.	H. T. Calder		Burlington, Vt.
Cheshire & Ashuelot	F. A. Perry	F. A. Perry	Keene, N. H.
Charlotte, Columbia & Augusta	Robert King	J. Q. Seats	Columbia, S. C.
Chicago & North-western		Thomas Hull	Chicago, Ill.
Wiscon. Mad. & Mill. Divis		Henry Hull	Fond du Lac, Wis.
Galena Division	R. W. Bushnell	Hugh Gray	Chicago, Ill.
Wiscon. Mad. & Mill. Divis	T. B. Tilton		Chicago, Ill.
Iowa Division	C. C. Elliott	William Campbell	Clinton, Iowa.
Peninsula Division	S. L Pierce		Escanaba, Mich.
Chicago & Alton	John A. Jackman	R. Reniff	Bloomington, Ill.
Chicago, Burlington & Quincy			
Eastern & Middle Division	E. T. Prindle	W. W. Wilcox	Aurora, Ill.
Galesburg Division	Wm. Wilson		Galesburg, Ill.
Quincy Division	Joel West		Quincy, Ill.
Burlington Division	S. E. Burtch		Burlington, Ill.
Buda Division	P. R. Sutton		Buda, Ill.
Chicago, Cincinnati & Louisville	C. F. Kidder	D. B. Howe	La Porte, Ind.
Chicago, Clinton & Dubuque	L. W. Worster		Dubuque, Iowa.
Chicago, Dubuque & Minnesota	J. G. Crockett		Dubuque, Iowa.
Chicago, Rock Island & Pacific	T. B. Twombly	B. K. Verbryck	Chicago, Ill.
Chicago & Michigan Lake Shore	Wm. L. Fitch	Oliver Udell	St. Joseph, Mich.
Chicago, Danville & Vincennes	J. A. Wood	W. H. Dunham,	Momencee, Ill.
Chicago, Danville & Vincennes	J. M. Sanborn		Chicago, Ill.
Chicago, Danville & Vincennes		W. H. Dunham	Danville, Ill.
Chicago & Canada Southern	§§J. Johann		Trenton, Mich.
Cleveland, Col., Cin., & Indianapolis	L. S. Young	William F. Smith	Cleveland, Ohio.
Cleveland and Pittsburg	N. E. Chapman	A. Steinbrunner	Cleveland, Ohio.
Cleveland, Mt. Vernon & Delaware	J. W. Holloway	J. W. Holloway	Akron, Ohio.
Cincinnati, Hamilton & Dayton	William Cullen.	W. H. H. Allison.	Cincinnati, Ohio.
Cincinnati & Muskingum Valley	Leroy Kells	Daniel Jewell	Lancaster, Ohio.
Cincinnati & Indianapolis Junction	W. McKinzie	Edwin Beeny	Indianapolis, Ind.
Cincinnati, Sandusky & Cleveland	John Y. Beatty.	William Earick	Sandusky, Ohio.
Columbus, Chicago & Indiana Central	(See Pitts. Cinn. & St. Louis)		
Concord	Chs. L. Eastman	M. W. Dickerman	Concord, N. H.
Concord & Claremont	J. N. Lander	A. Langmaid	Concord, N. H.
Connecticut River	John Mulligan	R. Hitchcock	Springfield, Mass.
Connecticut Valley	C. W. Hollister	N. A. Smith	Hartford, Ct.
Connecticut Western	N. Slingland		Hartford, Ct.
Contoocook River			Concord, N. H.
Conn. & Passumpsic Rivers	Horace Alden	Horace Alden	Lyndon, Vt.
Cumberland Valley	A. S. Hull	C. W. Nitterhouse	Chambersburg, Pa.
Cumberland & Pennsylvania	W. L. Jordan	J W. Sauerbach	Mt. Savage, Md.
Central of Georgia		C. C. Millar	Savannah, Ga.
Central of New-Jersey	*T. W. Peeples	George Hackett	Elizabethport, N. J.
Lehigh & Susquehanna Div.	L. C. Brastow	L. C. Brastow	Wilkesbarre, Pa.
Central Branch Union Pacific	Wm. D. Rowley		Atchison, Kansas.
Central R. R. of Iowa	O. R. Ford	O. R. Ford	Marshall, Iowa
Central Pacific	A. J. Stevens	Benjamin Welch	Sacramento, Cal.

D

Railroad.	*Master-Mechanic.*	*Master Car-Builder.*	*Residence.*
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Danbury & Norwalk	Charles A. Craig		Danbury, Ct.
Dayton & Michigan	William Cullen	W. H. Allison	Cincinnati, Ohio
Denver & Rio Grande	John Greenwood		Denver, Col.
Delaware, Lackawanna & Western	Walter Dawson	Robert McKenna	Scranton Pa
Des Moines Valley	James Lamb	R. E. Smith	Keokuk, Iowa.
Detroit & Milwaukee	Andrew Wilson		Detroit, Mich.
Detroit, Lansing, & Lake Michigan	Tho. G. Roberts		Detroit, Mich.
Delaware & Hudson Canal Co	James Dickson	Thomas Orchard	Carbondale, Pa.
Rensselaer & Saratoga Div.	W. B. Gage		Troy, N. Y.
Dorchester & Delaware			Cambridge, Md.
Dubuque South western	I. M. Smith	I. M. Smith	Farley, Iowa.
Dutchess & Columbia	W. G. Vanbuskirk	H. A. Webster	Fishkill, N. Y.
Dunkirk, Warren & Pittsburg	J. C. Haggett	J. C. Haggett	Dunkirk, N. Y.

E

Eastern		J. P. Somerby	Salem, Mass.
Eastern	John Thompson		East-Boston. Mass.
East-Tennessee & Virginia	Eli Hixon	Jos. Armbruster	Knoxville, Tenn.
East-Tennessee & Georgia	Eli Hixon		Knoxville, Tenn.
East Pennsylvania		Samuel Reeves	Reading, Pa
Elizabethtown and Paducah	W. D. Robb	T. A. Cordrey	Elizabethtown, Ky.
Erie Railway	‖M. E. Brown		Susquehanna, N. Y
Erie Railway	James B. Gregg		Susquehanna, N. Y.
Erie Railway	H. L. Brown	C. A. Smith	Jersey City, N. J.
Erie Railway	J. G. Hubbard	M. Wilder	Buffalo, N. Y.
Erie Railway	W. E. Cooper	W. E. Cooper	Hornellsville, N. Y.
Erie Railway		W. E. Rutter	Elmira, N. Y
Evansville & Crawfordsville	John L. White	Joseph Stiker	Evansville, Ind.
Evansville, Henderson & Nashville	H. M. Smith	W. H. H. Price	Henderson, Ky.
European & North Am. (of Maine)	A. O. Bailey	J. H. Brown	Oldtown, Maine.
Erie & Pittsburg	G. J. Parkin	John Young	Erie, Pa.
Evansville, Terre Haute, & Chicago			Terre Haute, Ind.

F

Flushing & North Side	Wm. La Suer		College Point, L. I.
Florida	A. W. Taylor	G. Hernandez	Fernandina, Fla
Flint & Pere Marquette	Sanford Keeler	Sanford Keeler	East-Saginaw, Mich.
Fitchburg	Geo. A. Cooledge	Enos Varney	Charlestown, Mass
Fitchburg & Worcester	John Webster	Samuel Stevens	Fitchburg, Mass.

G

Grand Trunk		Warren Noyes	Gorham, Me.
Grand Trunk	†Richard Eaton	J. W. W. McWood	Montreal, Canada.
Grand Trunk		Howard Fry	Sherbrooke, Can.
Grand Trunk		B. J. Mitchell	Portland, Me.
Galveston, Houston & Henderson	Wm. Macbeth	Wm. Macbeth	Galveston, Texas.
Grand Rapids & Indiana	J. M. Boon		Fort Wayne, Ind.
Great Western of Canada	†Wm. A. Robinson	F. Childs	Hamilton, Canada.
Georgia	William Hardman	T. M. Preval	Augusta, Ga.
Greenville & Columbia	J. T. Price	J. T. Price	Helena, S. C.

H

Harlem Extension	George W. Blanchard		Rutland, Vt.
Harlem Extension		C. S. Clapp	Bennington, Vt.
Hanover Branch	John J. Bingley	Henry Britcher	Hanover, Pa.
Hartford & New-Haven	John O. Chapman	F. Leppense	Hartford, Ct.
Hannibal & St. Joseph	H. A. Towne.	H. C. Whiting	Hannibal, Mo.
Hartford, Providence & Fishkill	Edwin Garfield	V. D. Perry	Hartford, Ct.
Hackensack & New-York	Abra'm Angausen		Hackensack, N. J.
Housatonic	C. R. Morris	J Ferris	Bridgeport, Ct.
Houston & Texas Central		F. S. Tull	Houston, Texas.
Houghton & Ontonagon			L'Anse, Mich.
Houston Tap & Brazoria	T. J. Shellhorn	T. J. Shellhorn	Houston, Texas.
Huntington & Broad-Top Mountain	D. G. Gilchrist	M. Tellerhoof	Saxton, Pa.
Hempfield	T. Marsh		Wheeling, Va.
Houston & Great Northern	T. J. Shellhorn	T. J. Shellhorn	Houston, Texas.

I

Indianapolis, Cincinnati & Lafayette	J. S. Patterson	S. Griffith	Cincinnati, Ohio.
Indianapolis, Peru & Chicago	John McKenna	John McKenna	Peru, Ind.
Illinois Central	**S. J. Hayes.	H. O. Wadlie	Chicago, Ill.
Chicago Division	Henry Schlacks		Chicago, Ill.
South ivision	David Oxley		Centralia. Ill.
North Division	J. B Edams		Amboy, Ill
Iowa Division	Thomas W. Place		Waterloo. Iowa.
Iowa & Missouri State Line			Farmington, Iowa.
Iron	Perry Scott.	Clem. Roetling	Ironton, Ohio.
Indianapolis & St. Louis	Wm. Barkla	R. B. More	Mattoon, Ill.
Indianapolis. Bloomington & Western	Tho. V. Losee	Tho. V. Losee	Urbana, Ill.
Ionia & Lansing	H. Loughlin		Lansing, Mich.
Indianapolis & Vincennes	A. E. Allcott		Indianapolis, Ia.
Ithaca & Athens	F. A. Brown		Ithaca, N. Y.

J

Jeffersonville, Madison & Indiana	Reuben Wells	John Higgins	Jeffersonville, Ind.

K

Knox & Lincoln			Bath, Maine.
Kentucky Central	J. R. Ledyard	J. L. Hackathorn	Covington, Ky.
Knoxville & Charleston			Knoxville, Tenn.
Kansas Pacific	**L. H. Waugh		Wyandotte, Kansas.
Denver Pacific Div	**L. H. Waugh		Wyandotte, Kansas.
Denver & Boulder Valley Div	**L. H. Waugh		Wyandotte, Kansas.
Junction City & Ft. Kearney Div.	**L. H. Waugh		Wyandotte, Kansas.
Arkansas Valley Div	**L. H. Waugh.		Wyandotte, Kansas.
Kalamazoo, Allegan & Grand Rapids			Kalamazoo, Mich.
Kansas City, St. Joseph & Council Bluff.	H. L. Cooper	H. L. Cooper	St. Joseph, Mo.

L

Lake Erie & Louisville	John Pero		Fremont, Ohio.
Lake Superior & Mississippi	W. McFarland	A. Coburn	St. Paul, Minn.
Lackawanna & Bloomsburg	Chas. Graham		Kingston, Pa.
Lehigh Valley	John I. Kinley		South-Easton, Pa.
Lehigh Valley	P. Hofecker	E. R. Brown	Weatherly, Pa.
Lehigh Valley	A. Mitchell	Mauch Chunk, Pa.	Delano, Pa.
Lehigh Valley	D. Clark		Hazleton, Pa.
Leavenworth, Lawrence & Gal.	S. M. Philbrick		Lawrence, Kansas
Little Rock & Fort Smith	A. Klohs		Little Rock, Ark.
Little Miami	J. H. Setchel		Cincinnati, Ohio.
London & Port Stanley			London, C. W.
Louisville, New-Albany & Chicago	Jacob Losey	Jacob Losey	New-Albany, Ind.
Long Island	Chs. A. Thompson		Hunter's Point, L. I.
Louisville, Cincinnati & Lexington	E. B. Gibbs	S. S. Pilson	Louisville, Ky.
Louisville & Nashville	†Thatcher Perkins		Louisville, Ky.
Louisville & Nashville	Jas. Montgomery		Bowling Green, Ky.
Louisville & Nashville		Isaac Owens	Louisville, Ky.
Louisville & Nashville	Tho. Welsh		Memphis, Tenn.
Louisville & Nashville	Richard Dolby		Edgefield, Tenn.
Louisville & Nashville	Wm. Russell		Decatur, Ala.
Louisville & Nashville	D. P. Rennie		Birmingham, Ala.
Nashville & Decatur Division	C. D. Knowles		Nashville, Tenn.
South & North Ala. Div.	John Skidmore		Birmingham, Ala.
Lake Shore & Michigan Southern	‡James Sedgley	††John Kirby	Cleveland, Ohio
Michigan Southern Division	William Hill		Elkhart, Ind.
" " "		S. S. Knapp	Adrian, Mich.
Toledo Division	Geo. H. Tier	Frank O. Bray	Norwalk, Ohio.
Erie Division	L. O. Gassett	J. Withyecombe	Cleveland Ohio.
Buffalo Division	B. H. Kidder	A. Robson	Buffalo, N. Y.
Lake Shore & Tuscarawas Valley	Charles Fellows	J. D. McIlwain	Black River, Ohio.

M

Marquette & Ontonagon	A. P. Burroughs	H. D. Lyons	Marquette, Mich.
Macon & Augusta			Macon, Ga.
Maine Central	J. W. Philbrick	J. W. Philbrick	Waterville, Me.
Macon & Western	D. M. Gogul	James A. Knight	Macon, Ga
Manchester & Lawrence	Chas. L. Eastman.	M. W. Dickerman.	Concord, N. H.

Railroad.	*Master-Mechanic.*	*Master Car-Builder.*	*Residence.*
Macon & Brunswick	M. Thornton	M. Thornton	Macon, Ga.
Marietta & Cincinnati	E. Bosley	E. Bosley	Chillicothe, Ohio.
Memphis & Little Rock	N. Greener	C. W. Wooldridge	Huntsville, Ark.
Memphis & Charleston	Michael Burk	A W. Drew	Memphis, Tenn.
Memphis & Charleston	H. N. Burford	Fabien Varin	Huntsville, Ala.
Mineral Point	Robert Hay		Mineral Point, Wis.
Mississippi & Tennessee	James Eblen	James Eblen	Memphis, Tenn.
Mississippi Central	Henry Gibbon	John E. Becton	Water Valley, Miss
Maryland & Delaware	Samuel Peters		Greensboro, Md.
Mississippi, Gains. & Tus			Gainsville, Ala.
Midland Pacific			Nebraska City, Neb.
Milwaukee & St. Paul	T. S. Davis	Wm. E. Kittrege	Milwaukee, Wis.
Milwaukee & St. Paul		John Baillie	Milwaukee, Wis
Milwaukee & St. Paul	J. Pattee	D. F. Wilson	Minneapolis, Minn.
Hastings & Dakota Division	C. C. Clements		Hastings, Minn.
Michigan Central	A. S. Sweet, Jr	J. B. Sutherland	Detroit, Mich.
Grand River Valley Division		James Potts	Jackson, Mich.
J'kson, Lans'g & Saginaw Div.	Andrew Wilson	Andrew Wilson	Jackson Mich.
Montgomery & West-Point	J. McVey	W. H Daniels	Montgomery, Ala.
Montgomery & Eufaula	James McCann	I. E. Holmes	Montgomery, Ala.
Mobile & Montgomery	James McFarland	L. Barham	Montgomery, Ala
Mobile & Girard	William Eyles	A. J. Nix	Girard, Ala.
Mobile & Ohio	L. J. Fleming	John McHugh	Mobile, Ala.
	B. S. Skates	B. S. Skates	Whistler, Ala.
Missouri River, Fort Scott & Gulf	John S. McCrum		Kansas City, Mo
Missouri River, Fort Scott & Gulf		Josiah Stahl	Wyandotte, Kan.
Missouri, Kansas & Texas	C. T. McIlvaney	J. Townsend	Sedalia, Mo.
Missouri, Iowa & Nebraska	Geo. Adams	Geo. Adams	Alexandria, Mo.
N			
Nashville & Chattanooga	John U. Eastman	J. G. Sawyer	Nashville, Tenn.
Nashville & Decatur	C. B. Knowles	C. B. Knowles	Nashville, Tenn.
New-Bedford & Taunton	Robert Chase	Robert Chase	New-Bedford, Mass.
New-Canaan			New-Canaan, Ct.
New-Brunswick & Canada	T. Armstrong	T. Armstrong	S'nt Andrew's, N.B.
New-Haven & Northampton	Henry Fox	Henry Fox	New-Haven, Ct.
New-York & Harlem	Wm. M. Strong	Leander Garey	New-York.
New-York Central & Hudson River	‡G. B. Van Vorst		Albany, N. Y.
New-York Central & Hudson River	Henry Watkeys		Syracuse, N. Y.
New-York Central & Hudson River	Amos Gould		Rochester, N. Y.
New-York Central & Hudson River	Jas. Butman	Wm. Johnson	Buffalo, N. Y.
New-York Central & Hudson River	Wm. Buchanan	John McKenna	New-York.
New-York Central & Hudson River	John Dikeman		East-Albany, N. Y.
New-York Central & Hudson River		Joseph Jones	West-Albany, N. Y.
New-York Central & Hudson River		George Rowe	Niagara Falls, N.Y.
New-York, Boston & Montreal			E. Tarrytown, N.Y.
New-York & Oswego Midland	Wm. H. Griggs	Wm. H Griggs	Oswego, N. Y.
New-York, Providence & Boston.	Jas. H. Anderson	Jas. HAnderson	Providence, R. I.
New-York, New-Haven & Hartford	H. Kittendorf	James Danvers	New-Haven. Ct.
New-London Northern	J. W. Dow	S. W. Caulkins	New-London, Ct.
New-Jersey Midland	J. E. Wiggins	J. E. Wiggins	Godwinsville, N. J.
New-Jersey Southern	Rufus Blodgett		Manchester, N. J.
New-Haven & Derby			New-Haven, Ct.
New-Orleans, Opelousas & Gt. Western	John McCluskey	Matthew Nolan	Algiers, La.
New-Lisbon			Leetonia, Ohio.
New-Orleans & Ohio	John R. Jordan	John R. Jordan	Paducah, Ky.
New-Orleans, Jackson & Gt. Northern	John Conlon	Charles Bartine	New-Orleans, La.
New-Haven, Hartford & Springfield			Hartford, Ct.
Naugatuck		George W. Gray	Bridgeport, Ct.
Newark & Bloomfield	Luke F. Tronson		Hoboken, N. J.
Nova Scotia	W. Johnson		Bedford, N. S.
North-Carolina	Rufus D. Wade	B. G. Sergeant	Co. Shops, N. C.
New-Orleans, Mobile & Texas	Josiah Bettis	W. H. Johnson	Mobile, Ala.
Northern Central	C. M. Lewis		Baltimore, Md.
Northern Central		G. W. Demarest	York, Pa.
North-Lebanon		Henry B. Oves	Lebanon, Pa.
North-Pennsylvania	Franklin Roop	Franklin Roop	Philadelphia, Pa.
North-Eastern	D. W. Haines	A. M. Corrie	Florence, S C.
Northern	James W. Lander	Albert Langmaid	Concord, N. H.
Northern of New-Jersey	T. W. Demorest		New-York.
Norwich & Worcester	Richard Colburn	G. R. Bentley	Norwich, Ct.
Northern of Canada	P. Clark.	P. Clark	Toronto, Can.
Northern Pacific	§§Geo. W. Cushing		St. Paul, Minn.
O			
Ogdensburg & Lake Champlain	William A. Short	J. R. Ames	Malone, N. Y.
Old Colony & Newport	J. K. Taylor	A. Gleason	Boston. Mass.
Orange, Alexandria & Manassas	James E. Waddey	John T. Nalls	Alexandria, Va.
Oil City & Pithole	George Thompson		Pithole, Pa.
Oil Creek & Alleghany River	J. S. McElroy	Jacob Williams	Corry, Pa.
Oil Creek & Alleghany	H.J.Bookhammer.	John Monks	Oil City, Pa.
Ohio & Mississippi		M. Contant	Cochran, Ind.
East Division	A. Thompson		Cochran, Ind.
West Division	H. Elliott	E. Martin	East St. Louis, Ill.
Oregon & California	§§J. Brandt.		Portland, Oregon.
P			
Paris & Decatur	John G. Clifford		Paris, Ill.
Panama	Chas. E. Stewart	J. G. Wilson	Aspinwall, N. G.
Pacific of Missouri	§§John Hewitt	John Hewitt	St. Louis, Mo.
Pennsylvania	§§G. C. Gardner		Altoona, Pa.
Pennsylvania	H. D. Garrett	I. W. Van Houten.	W. Philadelphia, Pa
Pennsylvania	E. L. Caum	Samuel W. Myers.	Harrisburg, Pa.
Pennsylvania	G. W. Strattan	John P. Levan	Altoona, Pa.
Pennsylvania	D. O. Shaver	R. S. Ramsey	Pittsburg, Pa.
New-Jersey Division.	John Headden	David H. Baker	Jersey City, N.
West-Penn. Division	C. B. Street	James F. Elder	Blairsville, Pa.
Philadelphia & Erie	Martin Walls	George J. Mason.	Sunbury. Pa.
	W. L. Foster	Robt.M.Messimer.	Renovo, Pa.
	W. L. Holman	Wm.P. Newcomb.	Kane, Pa.
	W. T. Smith.	David Cowley	Erie, Pa.
Philadelphia, Wilmington & Baltimore	S. A. Hodgman	S. A. Hodgman	Wilmington, Del.
Philadelphia & Reading	L. B. Paxson	Aaron Steinbach.	Reading, Pa.
Philadelphia, Germ'n & Norris'n	John Moyer	Nathan Pawling.	Philadelphia, Pa.
Philadelphia & Baltimore Central	S. D. Danfield	SamuelD.Danfield.	Chester, Pa.
Pittsburgh, Cincinnati & St. Louis			
Pittsburgh & Columbus Division	E. Pierce		Dennison, Ohio.
Pittsburgh & Columbus Division		James McGee	Steubenville, Ohio.
Little Miami Division		M. P. Ford	Columbus, Ohio.
Little Miami Division		J. H. Setchel	Pendleton, Ohio.
Col., Cin. & Ind. Division	Robert Curtis	Tho. Chamberlain.	Columbus, Ohio·
Col., Cin. & Ind. Division	W. H. Purdy	W. H. Purdy	Logansport, Ind.
Peoria & Rock Island	Theo. Mosher		Peoria, Ill.
Pittsburg, Fort Wayne & Chicago	S. M. Cummings	John Marquis	Alleghany, Pa.
Pittsburg, Fort Wayne & Chicago	J. M. Boon.		Fort Wayne, Ind.
Pittsburg, Fort Wayne & Chicago		J. J. Kirkland	Crestline, Ohio.
Pittsburg, Washington & Baltimore	W. H. Harrison	J. M. Rutter	Connellsville, Pa.
Peoria, Pekin & Jacksonville	R. F. Hurd	R. F. Hurd	Pekin, Ill.
Peninsular	T. G. Templeton.		Battle Creek, Mich
Portland & Rochester	John G. Brady	John G. Brady	Portland, Me.
Portland & Kennebec	John Ellis	J. W. Trussel	Augusta, Me.
Portland & Oxford Central	Geo. W. Battles	Geo. W. Battles.	Buckfield, Me.
Portland, Saco & Portsmouth	John Donnell		Portland, Me.
Port Royal			Beaufort, S. C.
Port Hope, Lindsay & Beaverton	H. G. Taylor	H. G. Taylor	Port Hope, Can.
Port Huron & Lake Michigan	R. C. Stewart	R. C. Stewart	Port Huron, Mich.
Providence, Warren & Bristol	Rufus Smith	J. Brightman	Bristol, R. I.
Portsmouth, Gt. Falls & Monmouth	James Tucker	E. Fall	Union Village, N.H.
Petersburg & Weldon	R. B. Andrews	Alex. Wright	Petersburg, Va.
Providence & Worcester	Joseph Kelly	Olney L. Smith	Providence, R. I.
Poughkeepsie & Eastern	John L. Driscoll	John L. Driseoll	Poughkeepsie, N. Y.
R			
Raleigh & Gaston.	J. B. Gayle	J. B. Gayle	Raleigh, N. C.
Richmond, Fredericksburg & Potomac	H. Kuhn	W. H. Trainham	Richmond, Va.
Richmond, Danville & Piedmont	John McFarland	H, Longest	Richmond, Va.
Richmond & Petersburg	John O'Brien	J. J. Martin	Richmond, Va.
Richmond & York River	C. H. Harris	J. L. Thompson	Richmond, Va.
Rome, Watertown & Ogdensburg	Wm. Jackson	H. H. Sessions	Rome, N. Y.
Reading & Columbia	B. Van Lew		Columbia, Pa.
Rome, Georgia	O. W. Harbin	O. W. Harbin	Rome, Ga.
Rochester & Genesee Valley	M. E. Brown	M. Wilder	Buffalo, N. Y.
Rockford, Rock Island & St. Louis	Joseph Elder	J. F. Nolte	Beardstown, Ill.
Rutland	N. L. Davis	Frank Sessious	Rutland, Vt.
S			
San Francisco & San José	R. B. Bishop	Frank Bellisle	San Francisco, Cal.
St. Croix & Lake Superior			New-York City.
St. Croix & Penobscot	Edward Bolton	A G. Page	Milltown, Me.
St. Lawrence & Ottawa	Calvin Dame	Calvin Dame	Prescott, Canada.
St. Louis & Iron Mountain	O. A. Haines	Oscar Doolittle	Carondelet, Mo.
St. Joseph & Denver City	E. Sleppy		Elwood, Kan.
San Antonio & Mexican Gulf	W. T. Bingham		Victoria, Texas.
South Side of Long Island	Geo. H. Griggs	M. Heitzman	Williamsburg, L. I.
St. Paul & Sioux City	F. C. Butterfield		Shakopee, Minn.
St. Louis, Vandalia, T. Haute & Ind	C. R. Peddle	H. Kirmse	Terre Haute, Ind.
South-Carolina	W. B. Smith	John Reed	Charleston, S. C.
South & North-Alabama	Tho. Jeffries	Tho. Jeffries	Lime Station, Ala.
Southern Central	Chas. G. Brown	H. Mooney	Auburn, N. Y.
Southern Minnesota	Wm. Lininger		Wells, Minn.
Southern of Canada	Albert Congdon	Albert Congdon	Fort Erie.
South-Western of Georgia	C. D. Wall		Columbus, Ga.
South-Western of Georgia	D. M.Gogul	James A. Knight	Macon, Ga.
South Shore	Warren E. Ray		Cohasset, Mass.
Stanstead, Shefford & Chambly	W. H. Smith	M. Sessions	Waterloo, C. E.
Schuylkill & Susquehanna	John E. Wootten	John E. Wootten	Reading, Pa.
Seaboard & Roanoke	J. B. Pendleton	J. B. Pendleton	Portsmouth, Va.
Stonington & Providence	J. H. Anderson	J. H. Anderson	Providence, R. I.
Selma & Gulf	Wm. T. Daughtrey		Selma, Ala.
Selma, Rome & Dalton	A. G. Maynes	W W. Peirce	Selma, Ala.
Sioux City & Pacific	Charles Foster	J. R. Dow.	Missouri Val., Iowa.
Spartanburg & Union	J. N. Benner	Jacob Rice	Union C. H., S. C.
Sheboygan & Fond du Lac	— Patterson		Sheboygan, Wis.
Sullivan & Erie			Tonawanda, Pa.
Syracuse & Binghamton, N. Y	B. G. Merrill	B. G. Merrill	Syracuse, N. Y.
Sycamore & Cortland			Sycamore, Ill.
St. Louis & South-Eastern	L. B. Salisbury		Mt. Vernon, Ill.
Nashville Division	H. M. Smith		Nashville, Tenn.
St. Louis, Kansas City & Northern	John E. Calhoun	C. S. Buck	St. Louis, Mo.
T			
Taunton Branch			Taunton, Mass.
Tioga	Peres Bonny	D. H. Stratton	Blossburg, Pa.
Texas & New-Orleans	R. B. Baer		Houston, Texas.
Tennessee & Pacific	William McKeand.	William McKeand.	Nashville, Tenn.
Toledo, Wabash & Western	W. F. Ray		Fort Wayne, Ind.
Toledo, Wabash & Western		David Hoit	Toledo. Ohio.
	T. G. Gorman		Springfield, Ill.
Toledo, Peoria & Warsaw	A. H. De Clerq	R. M. Hemphill	Peoria, Ill.
Troy & Boston	Foster Church	R. V. Coon	Troy, N. Y.
Toronto, Grey & Bruce			Toronto, Can.
U			
Union Pacific	I. H. Congdon	Geo. E. Stevens	Omaha, Nebraska.
Utica & Black River	Wm. E. Granger	David James	Utica, N. Y.
Utica, Chenango & Susquehanna	C. H. Brown		Utica, N. Y.
V			
Vicksburg & Meridian	Jas. B. Brown		Vicksburg, Miss.
Vineland			Vineland, N. J.
Vermont Central	J. M. Foss	Milton Sessions	St. Albans, Vt.
Vermont & Massachusetts	D. T. Davis	Jacob Marsh	Fitchburg, Mass.
W			
Wicomico & Pocomoke			Berlin, Md.
Wilmington, Charlotte & Rutherford	W. A. Gill	Thomas Myers	Laurenburg, N. C.
Wilmington, Columbia & Augusta	George Hall	W. J. Calais	Wilmington, N. C.
Westchester & Philadelphia	John Moyer	N. Pawling	Philadelphia, Pa.
Wilmington & Weldon	John Bissit	John Bissit	Wilmington, N. C.
Wilmington & Western			Wilmington, Del.
West-Jersey	W. McAllister	C. C. Williams	Camden, N. J.
Western Maryland	R. V. Dohoney	J. H. Nussear	Union Bridge, Md.
Winona & St. Peter	F. C. Ford	H. L. Preston	Winona, Minn.
Western North-Carolina	E. H. Marsh	E. H. Marsh	Salisbury, N. C.
Western R. R. N. C	M. W. Atkinson	M. W. Atkinson	Fayetteville, N. C.
West-Feliciana	R. C. Brower		Woodville, Miss.
Western & Atlantic	John H. Flynn	John Sherman	Atlanta, Ga.
Worcester & Nashua	George H Griggs.	George H. Griggs.	Worcester, Mass.
Welland	William Wells	William Pay	St. Catharine, C. W.
Washington & Ohio	Nathaniel Hayes	Joshua Harrison	Alexandria, Va.

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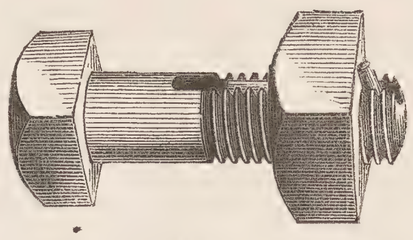
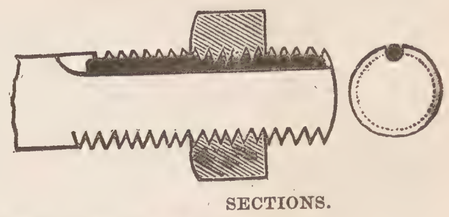


"CUMMING NUT-LOCK,"

Patented

June 16, 1868,

August 23, 1870.



SECTIONS.

Unequaled for CHEAPNESS, SIMPLICITY & EFFECTIVENESS.

This simple device, as will be seen by the engravings, consists of a groove being cut in the threaded part of a screw bolt into which is placed a key of copper wire, or other soft metal; when the nut is screwed on, it cuts a thread on the key, thereby making it impossible for the key to get out until the nut is taken off. When the nut is screwed up to its place, that part of the key over which the nut has passed is riveted up against the nut with a small punch, destroying the thread on the key. The nut, therefore, can not move backward until force is used, as with a wrench.

The groove can be rapidly cut with a simple machine designed for the purpose.

Experience has proved this device absolutely reliable, and it is the cheapest of all known devices for the purpose. By its use, old bolts on which the nuts have become too slack for use can be made as good as new, making it a great saving to railroad companies and others in that item alone. It is cheaper than a check-nut.

If the bolt should become slack from shrinking of timber or other causes, *the nut will always remain firmly attached to the bolt*, and, with the wrench, can be screwed up *any distance*, and the wire riveted up any number of times, or can be taken off without injury to the nut or bolt.

This is the only method in use that locks the nut firmly to the bolt without regard to place or surroundings, all others require some attachment that holds the bolt in its position, and a washer or other attachment to keep the nut from turning.

DIRECTIONS FOR USE.—Place the copper key in the slot, pointed end out, and beveled side up, in such a position that when the nut is screwed to its place about three-eighths of an inch of the key will project beyond its outer face. Then screw the nut to its place *over the key*, allowing it to cut its own thread in the copper. Then take a narrow flat set punch, and rivet the projecting part of the key *solidly* against the outer face of the nut. To tighten the nut: screw it up, and rivet the key tighter. To remove the nut: simply apply the wrench and unscrew the nut. It will cut its own way out through the copper. The same key can be used several times, by moving it outward a few threads in the slot.

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(*For Priming Dark-Colored Work.*)

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(*For Surfacing.*)

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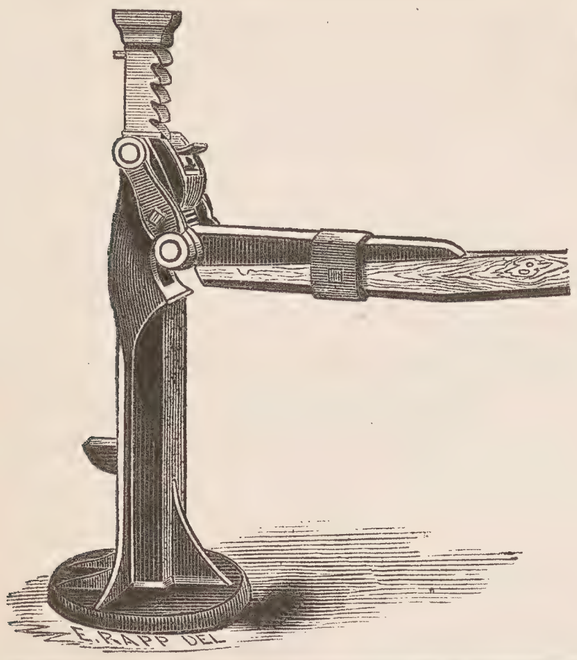

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ADAPTED TO ALL KINDS OF LIFTING,

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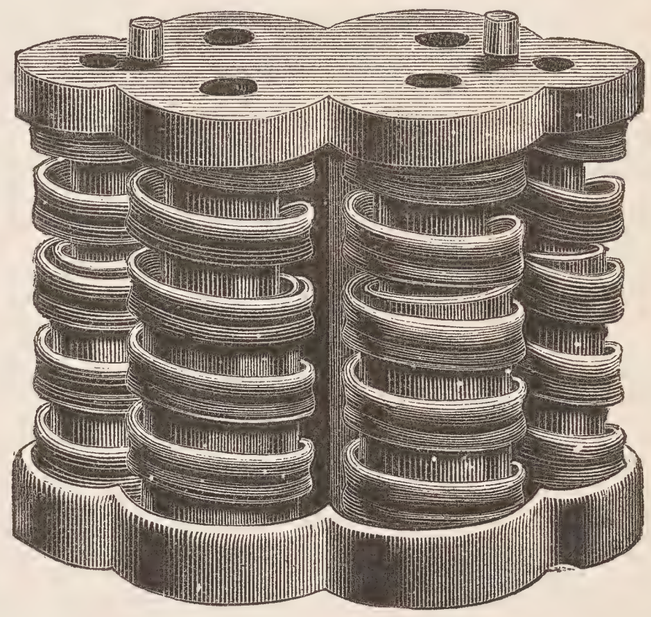

This Spring combines the materials of steel and rubber in a manner specially adapted to freight work and iron-truck bolsters. Four of them are sufficient for the equipment of a car.

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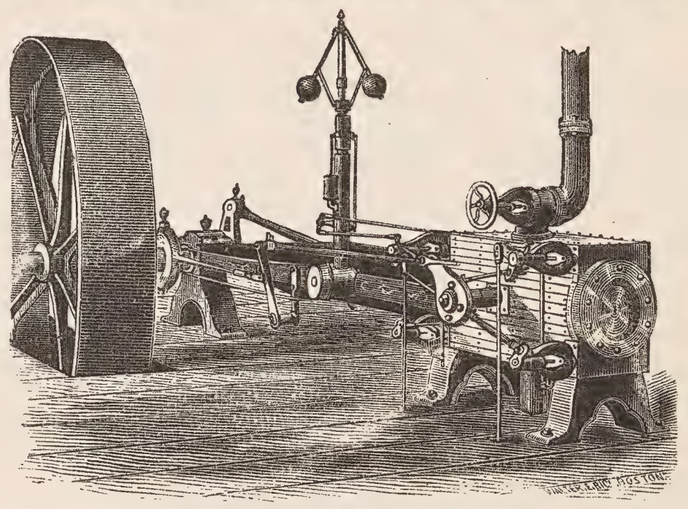

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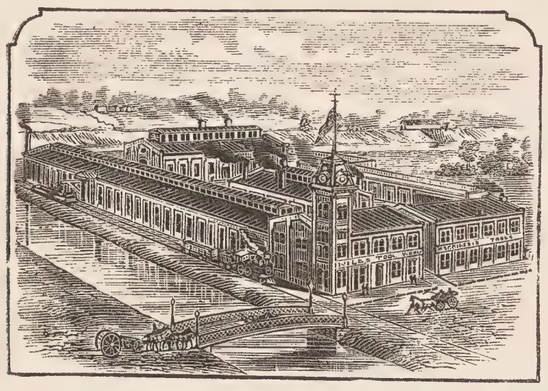

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Car Axle Lathes, (Gray's Patent,)
Car Wheel Borers,
Hydrostatic Wheel Presses, etc.

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PATENT ELASTIC FELT

For Car Seats, Mattresses, and Pillows.

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DEAR SIR: Press of business and absence from the city has prevented me from saying to you earlier, that our experiment the past year, in using your Patent Elastic Felt for Pillows and Mattresses, in the coaches of this Company, has proved entirely satisfactory, and that I now regard it as decidedly preferable to hair and feathers. It does not pack like hair, is soft, durable, and withal cheaper. Respectfully yours,
WM. R. BARR, President.

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Artificial Wood Ornaments.

We invite the attention of the trade, including

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To our variety of styles of ornaments, made to match black walnut in color, and which are perfectly fitted for use where not exposed to the weather. They have been sold extensively for several years, and have given entire satisfaction—so that all who have once used them have become constant consumers. They are artistic in design and unequaled in execution, being the production of the best artists, carvers, die sinkers, and moulders.

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Also Silver-Plating and Bronzing.

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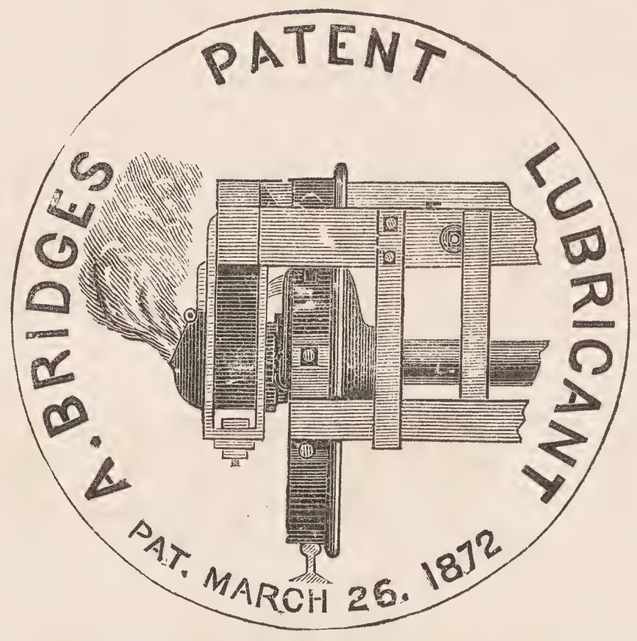
GREAT SAVING IN OIL!

And hot journals entirely prevented by the use of



For Railroad Car Journals and other Bearings

In presenting this Lubricant to the notice of Railroad and Steamboat Managers and Operators in Machinery generally, I do so with a practical knowledge of its merits, and with confidence that it will be found to possess invaluable qualities as a

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It has been in use, during the past two years, on a number of Railroads and Steamers, and is highly approved of.

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Brilliant Railroad Car Lamp, WITHOUT KEROSENE.

New Law of Massachusetts

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A Law has passed the Massachusetts Legislature (May 29, 1872) prohibiting the use of oil below 300° fire test, instead of 110° as heretofore. The

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meets the requirements of this law. It is now used by **all the Roads leading from Boston,** and by many other Roads, and by a large number of **Pullman's Palace Cars,** in the place of kerosene or candles.

THE LIGHT IS EQUAL TO KEROSENE

and the expense not half that of candles.

To use this oil in our common car lamps, now in use in all parts of the country, it is only necessary to **Change the Burner,** (costing about 50 cents per lamp.) For new lamps, in place of candles, send for lithograph and price-list. This oil is 55 cents per gallon in Boston, New-York, Pennsylvania, etc.

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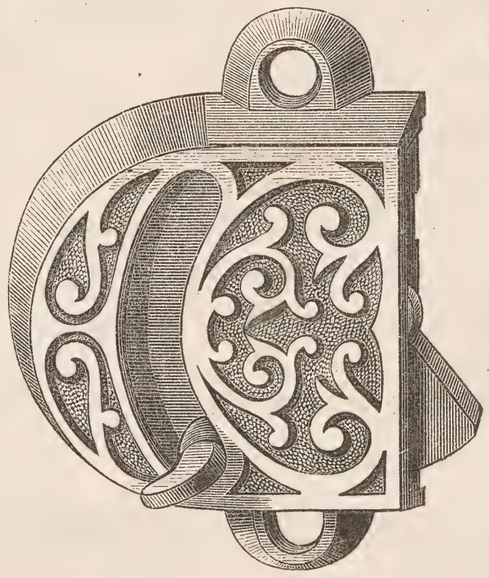

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Automatic Reverse-Locking

SASH-LOCK.

Patented June 4, 1872.

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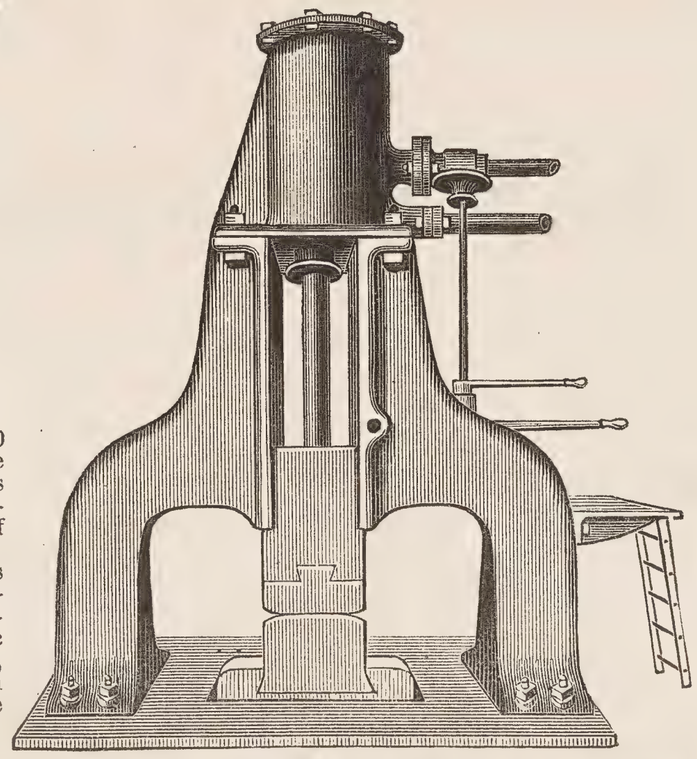

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Keep on hand and fill orders promptly for

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Denison's Patent Cooling and Lubricating Compound,

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It will immediately cool a *hot journal* while the cars are in motion, and no journal will heat where the box is packed with it.

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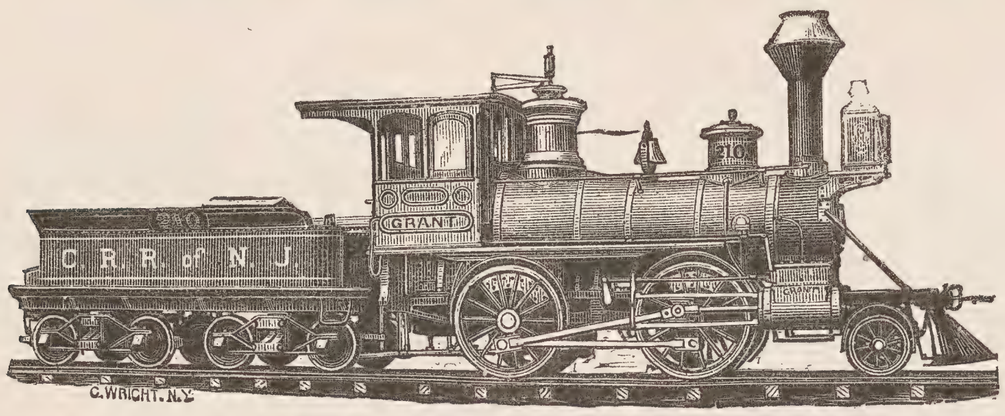

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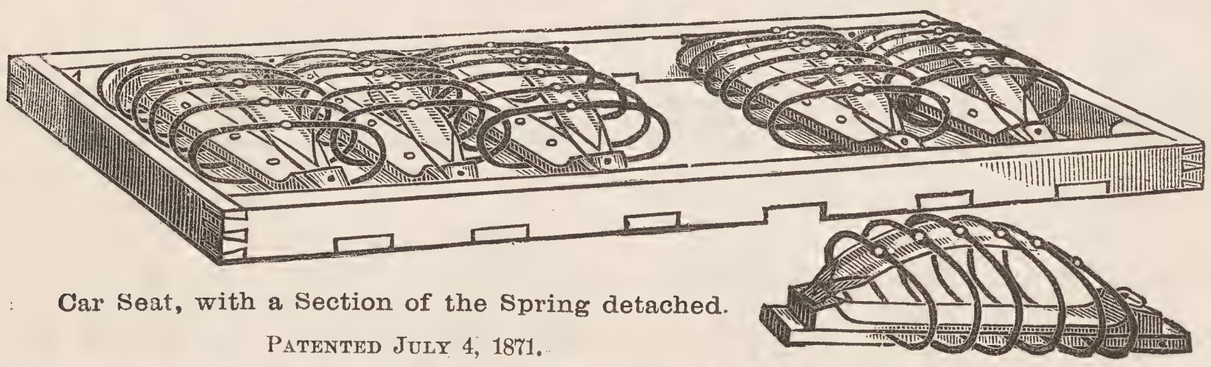
COBB'S ELLIPTIC STEEL SPRING.



Car Seat, with a Section of the Spring detached.

PATENTED JULY 4, 1871.

FOR CAR SEATS AND SPRING MATTRESSES FOR SLEEPING CARS.

These Springs have been in successful operation on a large number of the leading railroads in the United States for over three years.

OFFICE OF PULLMAN PALACE CAR COMPANY,
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GENTS.: Have used your Patent Elliptic Steel Spring *exclueively* for the last three years in over **300** of our cars, and are satisfied of their superiority over all other springs in use.

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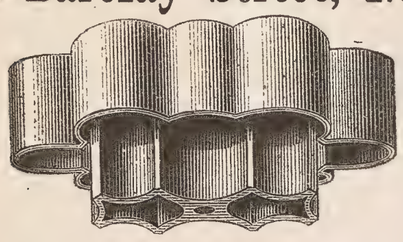
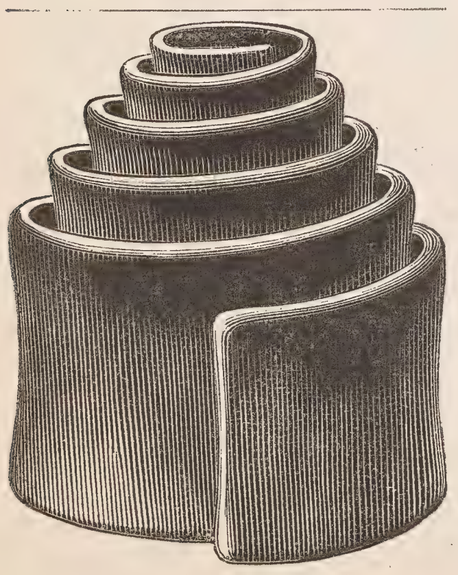


Group Rubber Centre Spiral Spring, (open.)



Original Volute Buffer Spring.

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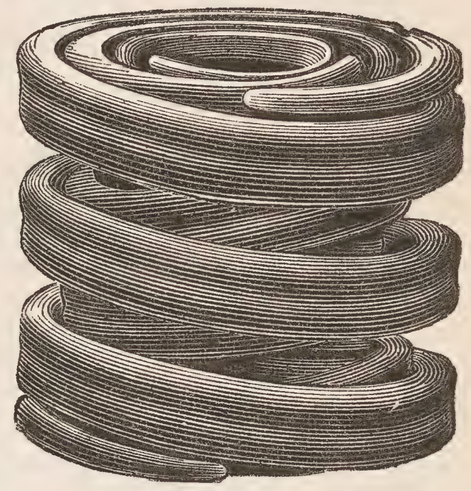
Railway Car Springs.

Our *Rubber Centre Spiral Group Spring* is pronounced the best freight spring in use. Any number of spirals can be grouped. Spirals furnished with or without cases.

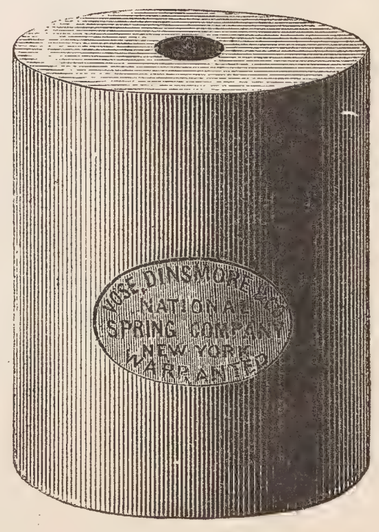
For bearing purposes on the equalizing bar, or for freight cars, our *Dinsmore Spring* is unsurpassed; it is also extensively used as a buffer. Being made of fluted bars of steel, with round edges, and with free spaces between the several coils, all friction from contact is absolutely avoided.

Our *Volute Spring* is too well-known as a buffer to require comment. They are made either plain, concave, or corrugated, have a perfect temper, and are without friction.

We manufacture solid *Rubber Springs* of as fine a quality as any in the market, and combining every requisite of power, elasticity and durability.



Dinsmore Nest Spiral Spring.



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Wearing Body.—For finishing, or last coat on railroad cars, coach bodies, and all work exposed to the weather. Works free under the brush, flows down smoothly, has a brilliant gloss, and is very durable.

Wearing Body, Quick Drying.—Is used for the same purposes as the Wearing Body.

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Polishing, Quick Drying, Extra Light Shade.—For the inside work of railroad cars, for pianos, light furniture, etc., etc.

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Pure Raw and Boiled Linseed Oil, White Leads and Zincs, Colors, Putty, Varnishes, Japans, etc.

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so long used and so highly recommended as the cheapest and best covering for all outside work ever offered. The CAR COLOR are all ground in Pure Boiled Linseed Oil, and packed in all sized kegs and barrels.

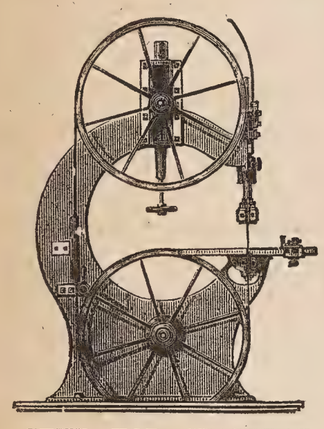
Samples of all the Colors, with Price-List, will be furnished on application.

Sole Agency and Manufactory of Smith & Dean's Patent Crystal Enamel (Filler) for Coach and Car Work.

Wood Cutting Machinery

FOR

Railway-Car Building, Ship-Building, and Band Sawing.



The Celebrated French "M. PERIN & CO." Band Saw Blade,

ANY LENGTH AND WIDTH.

RICHARDS, LONDON & KELLEY,

ATLANTIC WORKS,

SEND FOR CIRCULAR. **22d, Above ARCH, PHILADELPHIA, PA.**

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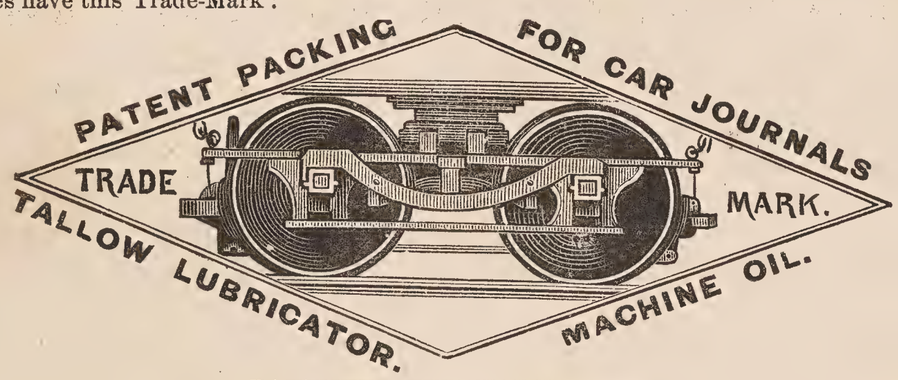
Manufactured by ISAAC U. COLES, No. 19 New Church Street, New-York.

The success attending ISAAC U. COLES & CO.'S PATENTED TALLOW PACKING for CAR JOURNALS has caused the production of an article similar to it in color, but not in virtue.

To prevent mistakes and consequent injury, I recommend to all parties to whom such materials are offered to examine first whether the packages have this Trade-Mark:



PATENTED FEBRUARY 27, 1872.

Parties using these materials recognize the necessity of this caution.

A large number of railway officials who have tested and used this packing, call it

THE MOST RELIABLE PREVENTIVE OF HOT JOURNALS.

Orders for sample packages are promptly filled.

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Bohannan's Patent Brass Railroad Car and Switch Locks,

WITH SPRING DROP AND CHAIN.

Of most beautiful finish and action, and said to be superior in every respect to any Railroad Lock offered in this country.

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☞ Over 33,000 cars now in service covered with this roof. It will last, without repairing, as long as the car it covers, and is more economical by one half than any roof in use. Furnished either of Galvanized Iron or painted with Metallic Paint.

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FOR SCROLL AND RE-SAWING.

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Adjustable Double Spindle Boring and Mortising Machines, Wood and Oval TURNING LATHES, Shafting, Pulleys, Hangers, etc.

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Machine Company,

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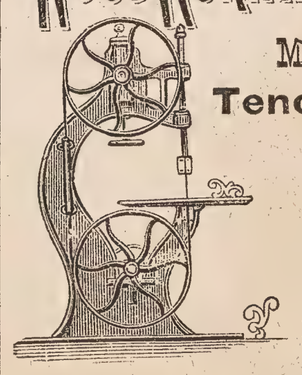

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The above, with our usual attractive stock of Veneers and Hard-Wood Boards in Mahogany, Walnut, Cedar, etc., are offered to the attention of

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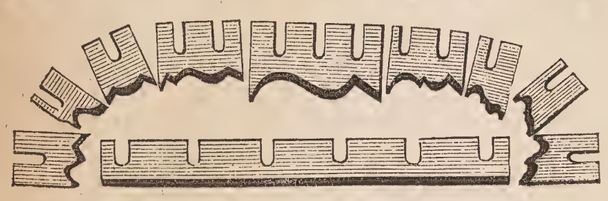

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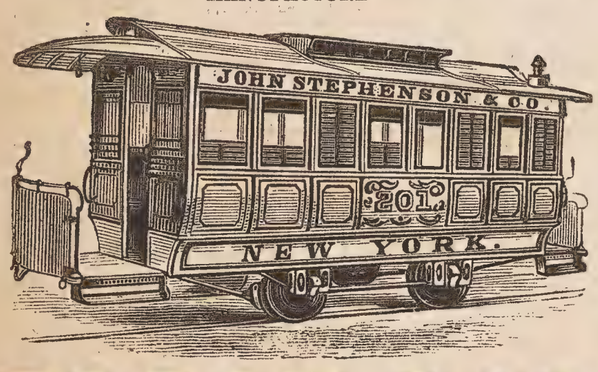

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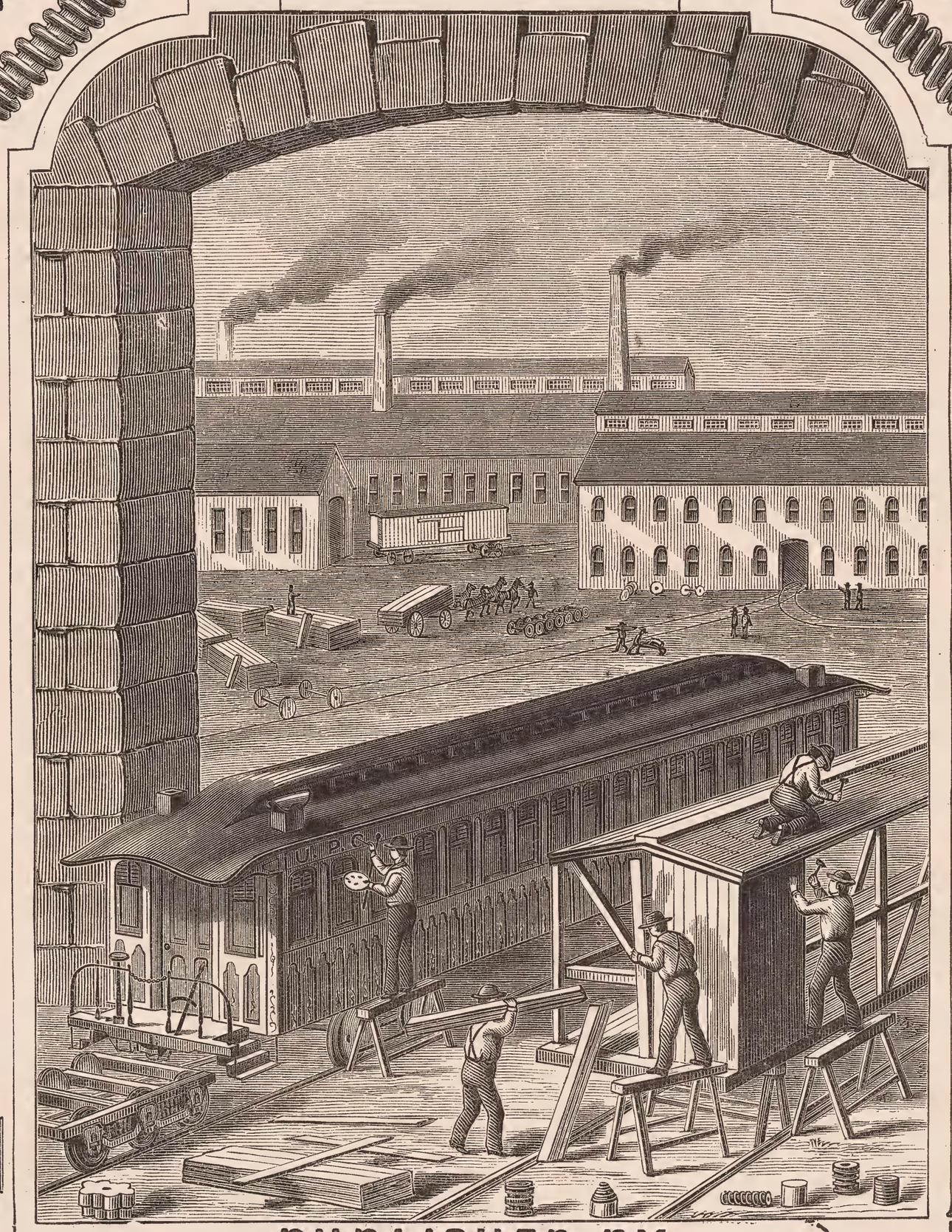

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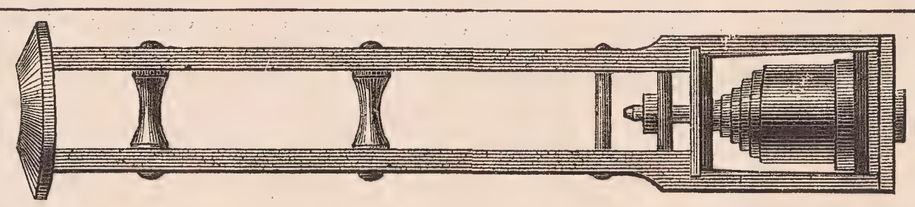

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OF

Valentine's Railway Varnishes.

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HENRY C. VALENTINE.

JANUARY 1, 1873.

OFFICE: NEW-YORK.
FACTORY: BROOKLYN.

FINISHING.

FREQUENT WASHING WITH COLD WATER WILL IMPROVE ITS LUSTRE AND HASTEN ITS HARDENING.

		Per Gallon.
Railway Body Varnish, . . . *(For finishing-coats on outside of Cars.)*	This Varnish differs from the Finishing Body Varnish used on carriages, in hardening free from tack more quickly, thereby rendering it more effectual in resisting cinders and dust. It is very pale, and dries out of the way of dust in about twelve hours. In working, fullness, lustre, and durability, it is unsurpassed. On old work, one, or at the most, two coats are sufficient. On new work, it is economy to use two or more coats over our **Hard Drying Body.**	$5 50

RUBBING.

Hard Drying Body Varnish, . *(For under-coats outside, and finishing inside, also for finishing Locomotives.*	This Varnish dries in eight to ten hours, and hardens so as to rub well in about four days. It is fully equal to our **Railway Body** in paleness, fullness, and lustre, and is much used for finishing over a leveled surface on hurried work not requiring the greatest durability. For best inside work it is particularly adapted.	5 00
Quick Leveling Varnish, . . . *(For under-coats on Locomotives and inside work, or for quickening the Hard Drying Body and Railway Body.*	This Varnish dries quicker and harder than our **Hard Drying Body.** In good weather it will harden so as to rub well in two days without sweating out. It is sufficiently pale for any light work. On outside work it should be protected with our **Railway Body.**	4 00

MISCELLANEOUS.

No. 1 Black Varnish, ... *(For smoke-stacks and other iron work.)*	This is an Elastic Black Varnish for Smoke-stacks. It dries and wears well. A little **Railway Body** mixed with it will improve it in lustre and durability.	1 50
Japan Gold Size, ... *(For binding, drying, and hardening colors.)*	This is a superior oil-drier, of light color, and strength nearly double that of ordinary Japan. On account of its paleness and the less quantity required, it is especially valuable for use with light paints, and being an oil-drier it is much less hurtful to the work than Japan. Once known, it is indispensable to Car-Painters, for binding colors, mixing roughstuffs, and facilitating their drying and hardening through.	3 50
Crown Coach Japan, ... *(For drying and hardening paints.)*	This is a light-colored, strong-drying shellac Japan, for hardening colors, and is well adapted to the use of the car-painter.	1 75
Ground Roughstuff, ... *(For producing a hard and level surface on bodies of Cars.)*	This is a mixture of mineral substances, combined with great care so as to furnish a dense body with a sharp grit. It is ground in **Japan Gold Size,** and is superior to all other roughstuffs, (sometimes erroneously called "fillings.") When used over a priming of one coat of **Permanent Wood Filling,** the first coat should be made elastic with raw oil, and the following coats reduced with turpentine, if required for working.	3 00
Dark Permanent Wood Filling, *(A patent article for priming outside work, and permanently filling and darkening natural woods.)* **Light Permanent Wood Filling,** *(Precisely same article as above, but being light colored it fills without staining the natural wood, and is specially adapted to priming Cars.)*	This article, being a very penetrating and non-evaporating anti-damp of extreme durability, is a perfect and permanent filling for the pores of wood. Experience has proved that it will not only support the color and varnish better and longer than the old method of lead priming, but that on account of its permanent elasticity, it will neither crack nor flake off; besides which, it saves time, labor, and cost, and is more convenient, cleanly, and healthful.	4 00

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We claim that our *Finishing Varnishes* are unsurpassed in the following qualities:

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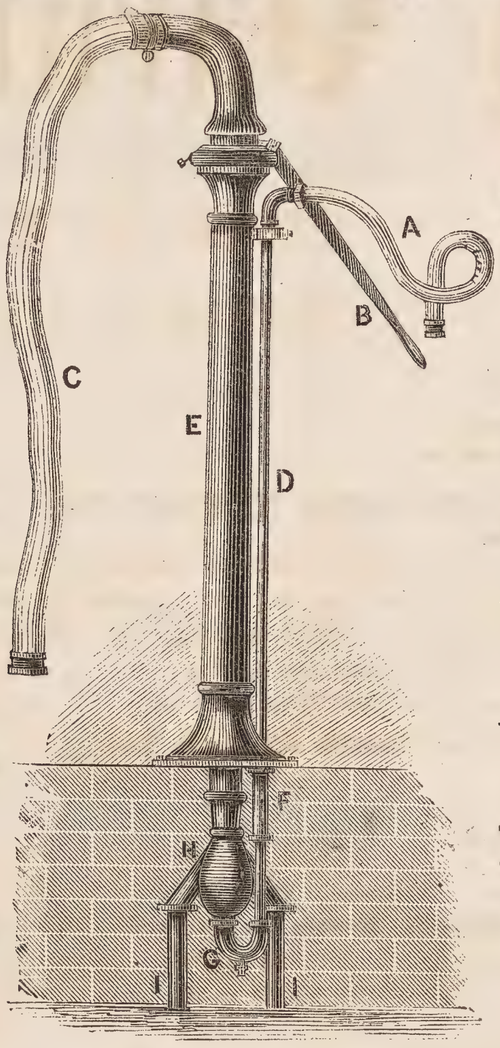


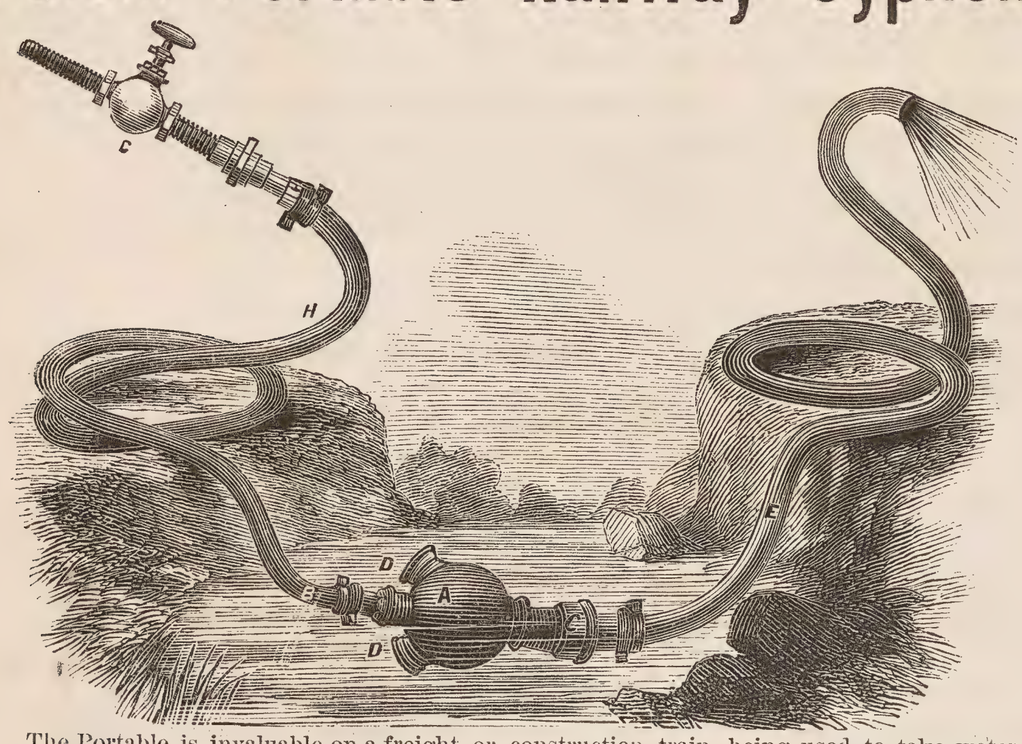
CAN NOT **FREEZE** IN ANY **CLIMATE,** UNDER ANY **CIRCUMSTANCES.**

Costs Less THAN ONE HALF THE PRICE OF A **Frost Proof TANK.**

The Engineer in charge of the Locomotive attaches the Hose A to a steam valve in the boiler. Steam passed through the pipe D and slip joint F into the globe H, producing a vacuum; the water is then lifted through the pipes I I and forced through the column E and hose C into the tender, filling any ordinary tender in about three minutes. When steam is shut off all the water in the pipes returns into the well, and any condensed steam passes off through the drip valve G, leaving nothing to freeze. The handle B serves to turn the discharge pipe and hose in any direction. The water delivered into the tender is warm, thus utilizing the steam used. The discharge tubes, represented above made of hose, can be made of iron if preferred.

LANSDELL'S

Patent Portable Railway Syphon.



The Portable is invaluable on a freight or construction train, being used to take water at points where there are no water stations. With it water can by taken from any point within one hundred feet of the track where there is water six inches or more in depth. The valve C is tapped into the locomotive boiler; steam is let on through the hose B; water is drawn through the orifices D D, and forced through the hose E into the tender, filling any tender with warm water in from six to twelve minutes.

Lansdell's Patent Steam Syphons, Double Suction, adopted by the United States Board of Supervisors, and approved by the Secretary of the Treasury for use on Steamboats.

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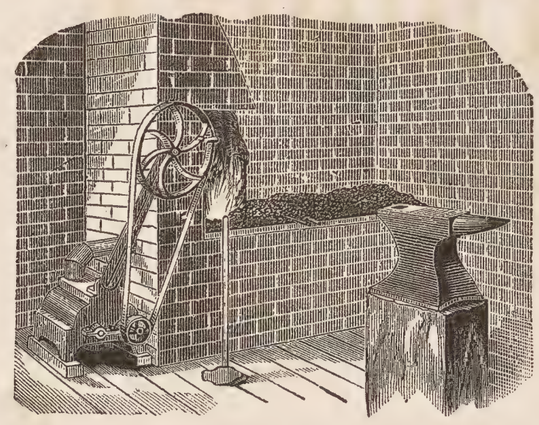
PATENT ROTARY HAND-BLOWER,



For Carriage Makers, Blacksmiths, and General Forging,

Can be operated by hand or power, and now used by many Railroads throughout the country, of which we name a few—namely, Camden and Amboy Railroad, Central Railroad of New-Jersey; Long Island Railroad; Staten Island Railroad; Belvidere Delaware Railroad; Vermont Central Railroad; Catasauqua and Fogelsville Railroad.

The advantages of this Blower over the old leather bellows, are:

GREATER DURABILITY.

Being made of Iron, it will outlast many pairs of leather Bellows.

GREATER ADAPTABILITY.

It gives a Force Blast that can be raised instantly from the slightest breath to the strongest blast.

GREATER DISPATCH OF WORK.

It heats much more rapidly than the Bellows, and is every instant under absolute control.

GREATER ECONOMY.

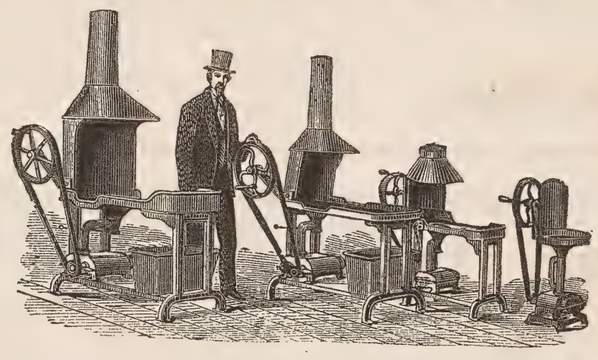
By producing a more perfect combustion, it saves a large amount of fuel, besides it occupies but a very limited space, and it ventilates the shop much better than bellows, as it takes the air from near the floor, the natural stratum of foul air.

Thus it saves *coal*, *time*, *space*, and preserves the *health*. No. 1 Blacksmith Hand-Blower will furnish ample blast for one large fire by hand or two by power.

ALSO

Patent Improved Portable Forge,

THE BEST IN THE MARKET.



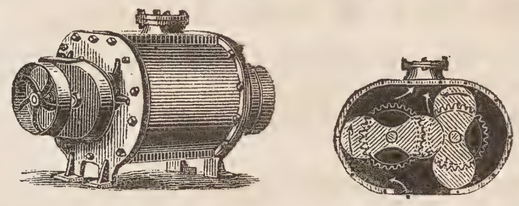
Can be operated either by hand or power, and now used by many Railroads—namely, Indianapolis and St. Louis Railroad; Lehigh Valley Railroad; Central Railroad of New-Jersey; Pittsburgh and Connellsville Railroad; Camden and Amboy Railroad and Ferry Co.; Boston, Hartford, and Erie Railroad; Raleigh and Gaston Railroad, and many others.

The Forge is compact, durable, reliable, convenient, easily moved, and yet has great heating capacity, as the blast is furnished by our Blower, making it in fact the best Portable Forge in existence.

P. H. & F. M. ROOTS ALSO MANUFACTURE

PATENT FORCE-BLAST ROTARY BLOWERS

OF ALL



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For Foundries, Blacksmiths' Shops, Rolling Mills, and for Ventilating Public Buildings, Mines, Tunnels, etc.

The Hudson Railroad Co., Indianapolis and Cincinnati Railroad Co., Hanover Branch Railroad Co., Albany and Susquehanna Railroad Co., and Chicago, Burlington and Quincy Railroad Co. have them in use.

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S. S. TOWNSEND,

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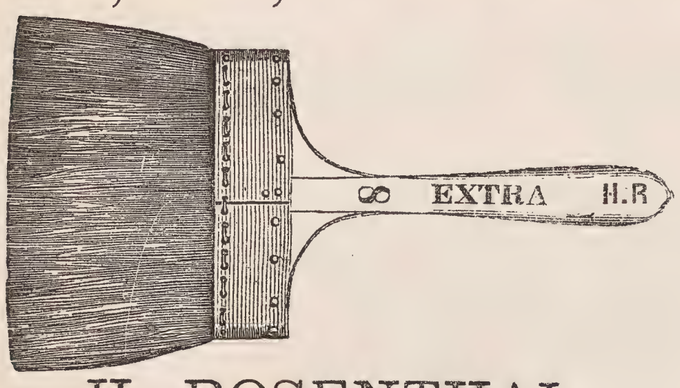

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HAMMILL & GILLESPIE,

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Are constantly receiving all the best brands of

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Hitchcock Car Ventilator.

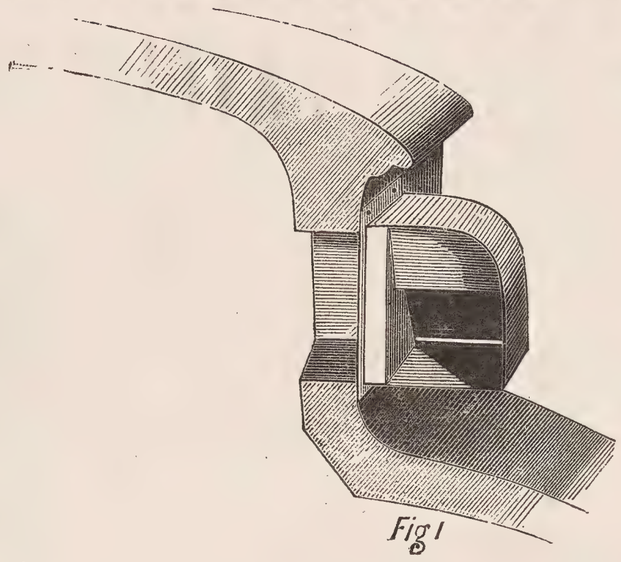
Fig 1

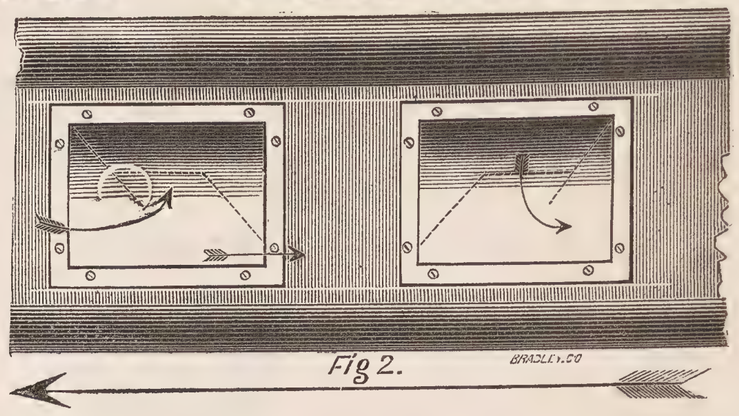

Fig 2.

THE Ventilators are placed as usual in the car roof as shown in Fig. 1, their mouths facing alternately in opposite directions, those facing forward admitting the air, and those facing backward affording an exit. Fig. 2 represents a side section of the raised roof with two of the ventilators alternately arranged. When the car is moving in the direction indicated by the arrow, it will be seen, by the curved darts, that there is an ingress and egress of air constantly taking place. The operation of the ventilators is reversed with precisely the same effect, when the car moves in the opposite direction. The internal structure is such that the dust and cinders passing into the mouth of the ventilator are intercepted by striking against two shields, shown in Fig. 1, and indicated by dotted lines in Fig. 2, and are thus naturally thrown to the bottom, where they are carried out through a small opening as shown in Fig. 1, and by the straight dart in Fig. 2, a current of pure air being forced into the car at the same time through a lateral opening. The faster the car moves, the greater is the quantity of air admitted and expelled, thus securing a free circulation which does not subject the occupants to a direct current or draught. The ventilator is also noiseless in its operation. There is no clattering of valves, and no change is necessary when the car reaches its destination. Once put in place, it is always in readiness, and runs itself independent of all employees.

H. D. CARROLL & CO., Springfield, Mass.,

Proprietors and Manufacturers.

ROBERT HITCHCOCK, Inventor.

MILLER'S TRUSSED PLATFORMS. Compression Buffers and Automatic Couplers for Railroad Passenger Cars.

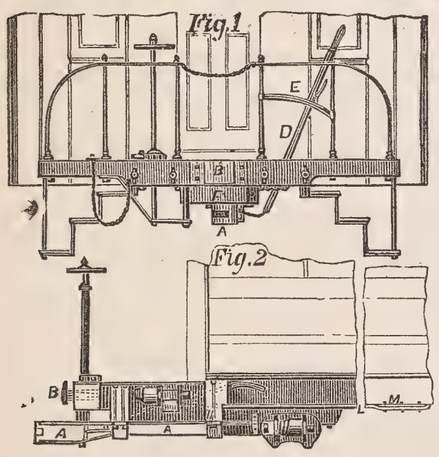

Fig.1

Fig.2

Fig.5

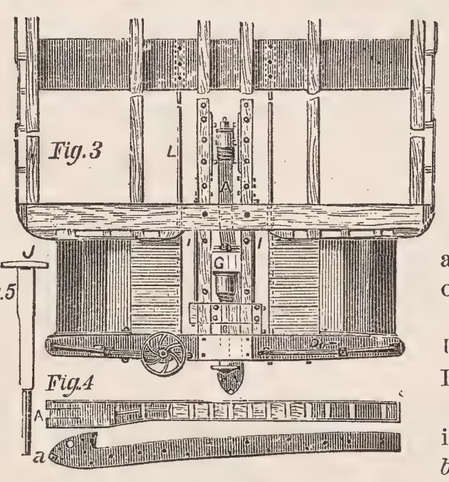

Fig.3

Fig.4

Office, 231 Broadway, (Rooms 4 and 5,) New-York.

Send for Illustrated Pamphlet, and call and see working models. E. MILLER, Patentee.

DESCRIPTION.

Figure 1 is an elevation: Figure 2, a longitudinal section; Figure 3, a plan of an end of a car to which the arrangement has been applied: and Figures 4 and 5 show top and side views of the "Hook" and "Buffer," drawn on a larger scale than that of Figures 1, 2, and 3.

The letters refer to the same parts in all the figures. A is the coupling "Hook," B the "Buffer," C the "Stop," D the "Lever," E the "Quadrant Ratchet," F the "Truss Beam," G the "Spring Beam," H the "Suspender Beam," I the "Upward Trusses," K the "Main Spring," L the "Downward Trusses," and M the "Bolster."

The Platforms, instead of being located below the centre line of the main sills of the cars, are placed *in* that ine, and held there by the Trusses I and L, so that the point of contact (in Buffers B) is *in* the said centre line and *not below* it.

The coupling "Hook" A is attached to the draw spring the same as the ordinary draw head, and at the same height above the track, but in such a manner that the outer end is free to move laterally for a short distance. The Coupling Hook projects beyond the platform. The Stop C is placed under the Buffer Beam to prevent accidental uncoupling. When two cars are brought together, the Coupling Hooks, from *their shape*, push each other aside, until the Buffers B are compressed hard on the Buffer Springs, then—*the points of the hooks having passed each other sufficiently far*—the Hooks are carried forward by their main-springs, and thus the "*Coupling*" and "*Compression*" are both effected automatically *and at the same time*, and without the use of links and pins. When two cars are thus coupled together, the *head* of the *Hook* of each car is under the Buffer Beam of its opposite car, and the platforms are close together, (about 4 inches apart.) The effect of this is, *one platform can not be forced over the other*, nor can a *child* fall between the platforms; the dust and rain are nearly all shut out; the "Compression" makes the train run steadily, and prevents all jerking at starting and stopping.

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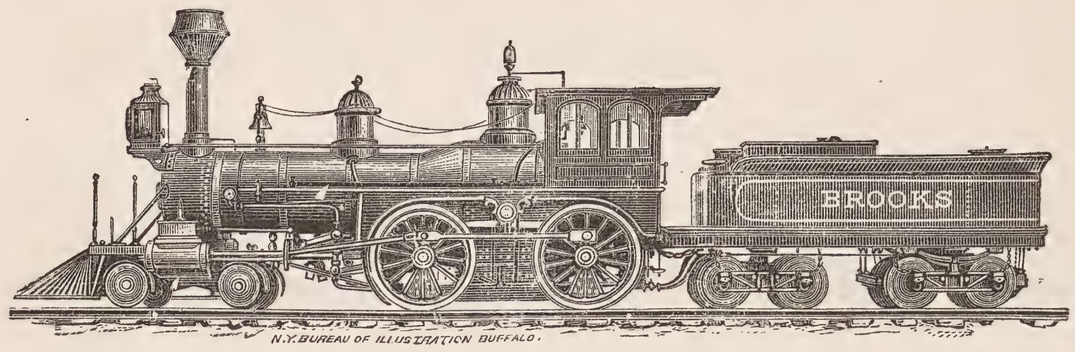

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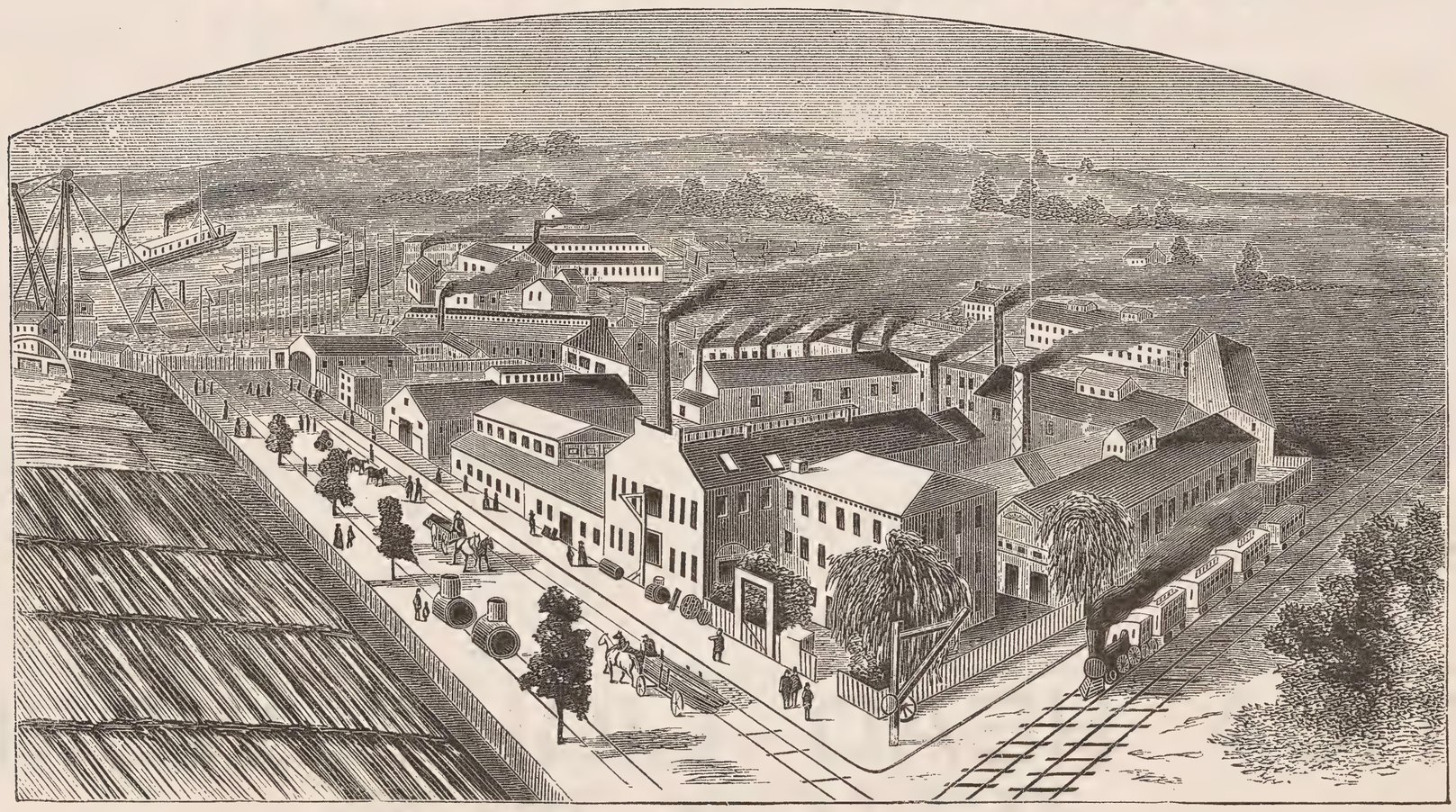

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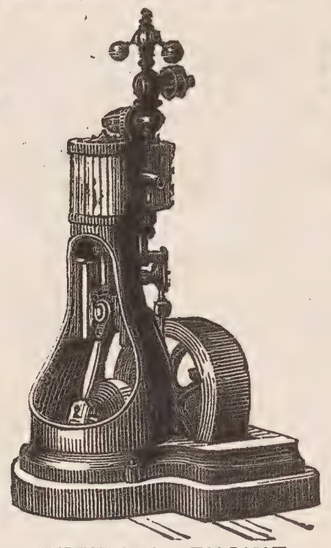

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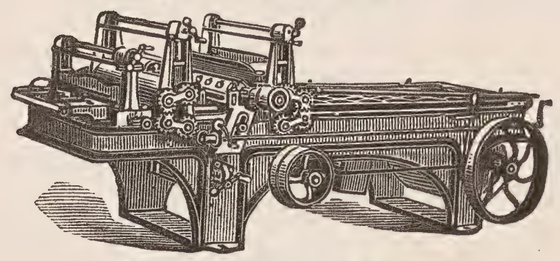

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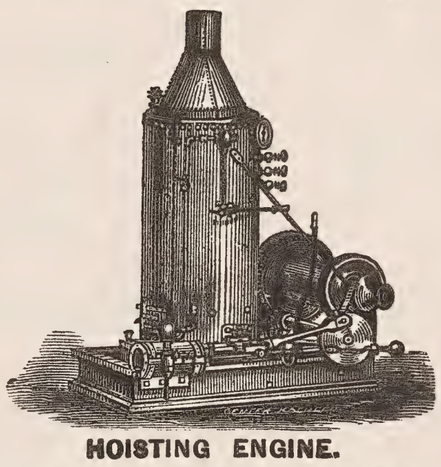

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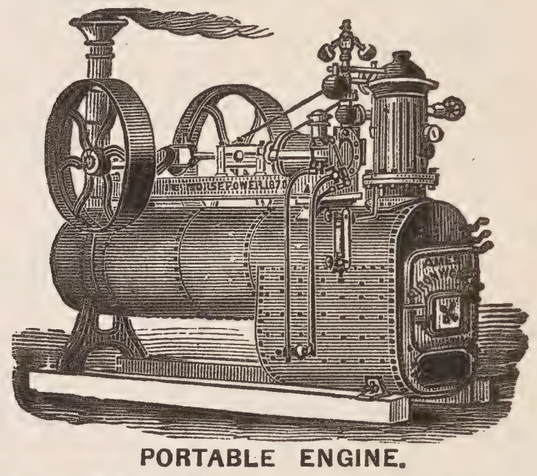

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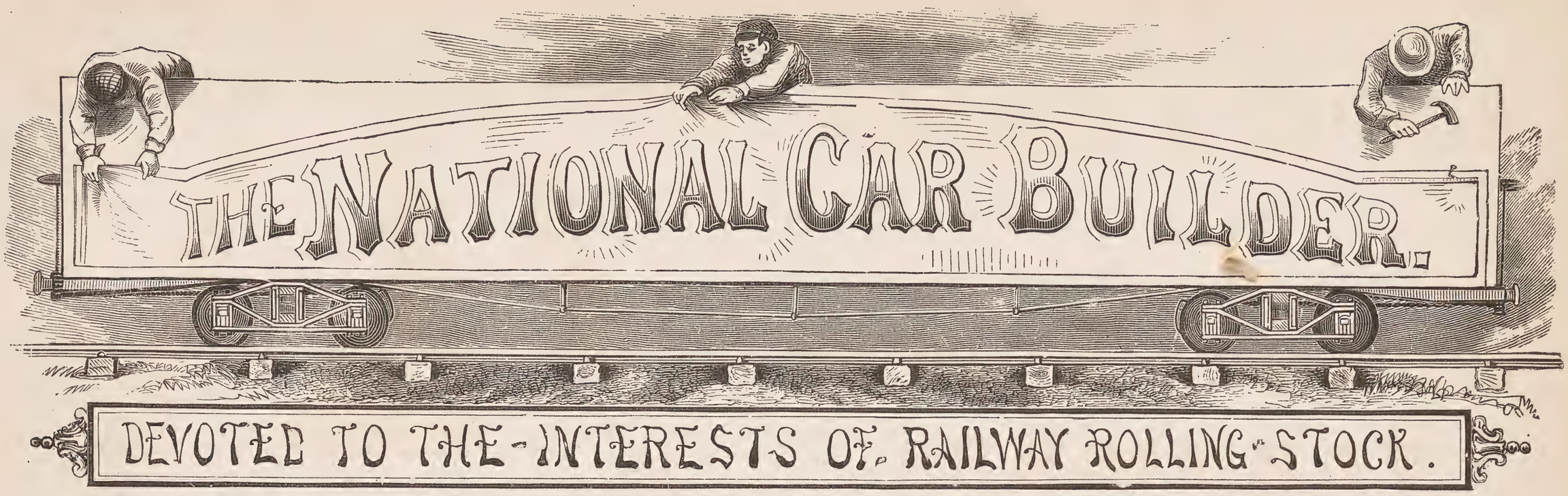

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No. 3.

MARCH, 1873.

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Railway Master Mechanics' Association.

AT the last annual convention of this association, sundry committees were appointed to obtain information and report upon various subjects to come up for discussion at the next meeting. The following circulars have been issued by the committees named below, containing inquiries to which replies are requested at as early a day as practicable, to enable the committees to embody the information thus obtained in their respective reports.

MACHINERY FOR REMOVING SNOW FROM THE TRACK.

The committee of the American Railway Master Mechanics' Association, appointed to report upon the subject of "The Machinery for removing Snow from the Track," at their next annual meeting, to be held in Baltimore, on the first Tuesday in May, 1873, desire to call your attention to the following questions, and request an early reply:

1. Is your road over prairie or hilly country, and is it exposed to heavy winds?

2. How deep, generally, are your snows, and do they become very hard from effect of heavy winds?

3. Are you liable to wet, followed by cold weather, making ice, or are your winters, generally, cold and dry?

4. Do you use pony plows attached to your engines?

5. What arrangements have you for clearing flanges?

6. For heavy work how many engines do you use, and what is your method of managing a snow train?

Please describe your plows that you like best for the different conditions of snow, and if convenient please send photographs or tracings of plows, and machinery for clearing flanges.

In answering the above questions, the committee earnestly request that you give them your experience and ideas upon all points which may have been suggested to you in connection with this subject.

J. W. PHILBRICK, Maine Central R.R.,
J. M. FOSS, Vermont Central R.R.,
E. STUDLEY, late of Concord,
Committee.

Please address your replies to J. W. Philbrick, M. M. M. C. R. R., Waterville, Maine.

CAR AND LOCOMOTIVE-AXLES.

The committee appointed at the last convention of the American Railway Master Mechanics' Association to investigate and report upon "The best form and proportions of Axles for Cars and Locomotives, also whether there is any thing to be gained by the use of Compound Axles and Loose Wheels," desire information regarding the following points:

1. The dimensions of the standard car-axles now used on your road, which please mark on the engraving below.

2. When such standard axles break, at what point does the fracture usually occur?

3. State, as near as you can, what proportion of breakages of axles *of the dimensions given* occur close to the hub of the wheel on the inside, and the relative proportion of breakages at other points?

4. If there were no car-axles now in use, what size would you recommend for the diameter and length of journal for a *universal standard axle* for 4 feet 8½-inch gauge roads?

5. What for the diameter at the wheel-seat and at the centre of the axle?

6. What are the dimensions of the driving and truck-axles of your most approved locomotives?

7. State where the fracture of such axles occurs in cases of breakage?

8. What is your rule for forcing on car and locomotive-wheels; that is, how much larger is the axle than the hole in the wheel; and how much is the maximum pressure allowed in pressing them on?

9. Have you used any compound axle? or any axle upon which the wheels are loose or can turn independently one of the other?

10. Have you any means of knowing *experimentally* the difference there is between the resistance of a car or truck with loose and one with tight wheels in passing around curves of any given radius? if so, give the committee a report of such experiments.

11. What is your opinion of compound axles or loose wheels?

Replies to the above inquiries should be addressed to the chairman of the committee, 72 Broadway, New-York, as early as possible, as much work remains for the committee to do after the answers are received.

M. N. FORNEY, 72 Broadway, New-York,
COLEMAN SELLERS, Philadelphia,
GORDON H. NOTT, Boston and Lowell and Nashua R.R.,
Committee.

RELATIVE COST OF OPERATING DIFFERENT GAUGES.

The committee appointed at the last annual convention of the American Railway Master Mechanics' Association, to report upon "The relative Cost of Operating Roads of Gauges of three feet six inches or less, and those of the ordinary four feet eight and a half-inch gauge," respectfully submit the following inquiries, with the request that you will send replies thereto as early as practicable, with any additional information relative to the subject which you may be able to give:

1. Have you had any experience in operating railroads of gauges narrower than 4 feet 8½ inches?

2. If so, have you observed any material difference in the cost of transporting any given amount of freight or number of passengers, as compared with the cost of doing an equal amount of business on a road of the standard 4 feet 8½-inch gauge?

3. If you can do so, furnish the committee with statistics regarding the *relative* cost of transportation on the roads of different gauges? Or your reasons for thinking there is or is not a difference?

4. In your opinion would *small* cars, say of half the capacity of those ordinarily used, be more economical than the latter, for a road with comparatively little traffic?

5. What do you think the difference in weight *which is due to the distance between the rails*, would be between such cars of equal strength for a 3-feet gauge, and for one of 4 feet 8½ inches? And to what causes is the difference attributable?

6. What would be the difference in the percentage of cost of such cars?

7. It is also said that narrow (3-feet) gauge cars, offer less resistance in passing around curves than wide (4 feet 8½ inches) gauge cars of the *same character and weight*; in your opinion, is there any material difference in the power required to draw such cars around curves of say 400 feet radius, and are your conclusions based upon practical experiment or theoretical consideration?

8. Do you think that for a section of country with a small traffic a light narrow-gauge road would be more economical to operate than an equally light road and equipment of the standard (4 feet 8½ inches) gauge; and if either road would have any advantages over the other, what are they?

J. T. ROBINETTE, A., M. & O. R.R., S. S. Division,
J. U. EASTMAN, N. & C. R.R.,
W. BELL SMITH, S. C. R.R.,
Committee.

Please address replies to J. T. Robinette, M. M. S. S. Division, A., M. & O. R. R., Petersburg, Virginia.

SUPPLYING FUEL AND WATER TO LOCOMOTIVES.

DEAR SIR: At the convention of the American Railway Master Mechanics' Association, held in Boston, in June last, the undersigned were appointed a committee on "The Machinery and Appliances for supplying Fuel and Water to Locomotives."

Your committee would respectfully request answers to the following questions:

1. Do you depend wholly on pumps or injectors, or other similar article or appliance, or either of them, for supplying water to locomotives?

2. Does it take more fuel to run an engine when injectors are depended on wholly than it does to run one when pumps are wholly depended upon?

3. From your own experience, what is the best method of supplying water to locomotives?

4. Have you any machinery or appliance for supplying fuel to locomotives?

5. Do you know of any better method of supplying locomotives with wood than by hand, or coal with a shovel?

6. What is your method of loading wood and coal on tenders?

7. What is your method of measuring wood?

8. How do you obtain the weight of coal supplied to tenders?

H. L. LEACH, Supt. Hinkley L. Works,
WILSON EDDY, Boston & Albany R.R.,
E. GARFIELD, H., Prov. & Fishkill R.R.,
Committee.

Please address replies to H. L. Leach, Superintendent Hinkley Locomotive Works, Boston, Mass.

Railway Passenger-Cars—The Advantages and Defects of their Construction.

BY J. M. BLANCHARD.

In my last article I spoke briefly upon the subject of ventilation, and suggested a plan which it is believed would be found effective when the cars are in motion. It is apparent, however, that any system of ventilation, in order to be perfect and meet the requirements of the case, must provide the means for thoroughly ventilating a car during all the time it is occupied, whether in motion or standing at a station, as it is well known that the want of proper ventilation when standing still is felt more seriously than when moving at the usual speed. It must be admitted that this is a subject beset with difficulties, and one to which the best minds, in this as well as other countries, have often been directed, and that some, at least, have almost despaired of producing any device which would operate satisfactorily under the widely varying circumstances. The writer is well aware that he places himself in a position to be regarded as an egotist in attempting a solution of the problem.

The question naturally arises, Is it impossible to construct a ventilating apparatus for a car that will fulfill all the conditions required, whether the car is in motion or standing still, but connected with the engine? Without attempting to answer this ques tion positively in the affirmative, I desire to make some suggestions which, if adopted, would, I think, go far toward bringing about this result. Such an apparatus should be capable of taking from a car while occupied, whether standing still or running, all the air contained in it as fast as such air from any cause becomes vitiated, and of supplying its place with the coolest and purest that can be had. Ventilation, when properly understood, does not consist in allowing currents of wind to enter at the windows of a car and pass out at the apertures in or near the roof, but it does consist in removing impure air from a car or any space from which it is desirable to remove it, and allowing its place to be supplied with air which is pure. Merely supplying such air in rapidly passing currents, is not, in any sense, proper ventilation. It is a well-understood fact that currents of wind passing through an aperture with any considerable force, if allowed to blow upon a person, is injurious to health, and hence the great necessity of an equable distribu tion of the air admitted. The well-known law go verning the movements of heated air makes it certain that the heat radiated from a number of persons sufficient to fill a car, will cause the air to ascend and fill the upper portion thereof, and consequently the eduction apertures are very properly placed in or near the roof; and it would seem logically to follow that the air admitted should enter at the bottom, in order that its distribution may be even and general throughout; and that in its upward movement it may aid in expelling the vitiated air above. In order that this may be accomplished, I suggest that the floor of cars be made double, and that the air be carried to the space between the floors by pipes, the upper ends of which shall be above the roofs in order to avoid as much as possible the ingress of dust and cinders. With floor and pipes thus arranged, and with the discharge pipes or apertures as suggested in my previous article, it seems reasonable to claim that while the cars are in motion, there would be such a tendency to the production of a vacuum, as to cause the air to pass rapidly out of the car, which would of course reduce the pressure within to such an extent as to cause an inward flow from the outer atmosphere through the pipes above referred to, and which, if admitted into the space between the floors, and from thence through a great number of apertures to the interior of the car, would cause such an equable distribution as to benefit all the passengers alike. A very important feature of this system of ventilation would be, that all the windows of a car could be kept closed, and the occupants thereby relieved from the great annoyance arising from the admission of dirt and cinders.

Having pointed out a method of ventilating cars while in motion, which is believed to be worthy the attention of railroad men and car-builders, the more difficult task remains of showing how such ventilation may be continued so long as the cars are connected with the engine, even though they are standing still. It is apparent that the method above described would, if applied, become entirely inoperative the moment the motion of the cars ceased, it being in that respect like the various methods now in use. In order that proper ventilation may go on under the circumstances above alluded to, it is evident that some means must be devised which shall, to some extent, be separate and independent of those above described. The arrangement of the induction pipes of the floors, and of the apertures in the upper floor above alluded to, will be well adapted to use with the devices hereafter suggested; in fact they will probably be the best that can be devised, and it will only be necessary to add such features as will remove the air from the car and thus cause a current of fresh air to flow in. This last-named result may be accomplished by means of a steam-jet placed upon the locomotive in any convenient position, so that it may be connected with pipes communicating with the upper portion of the cars, such pipes being of sufficient dimensions to permit the passage of the air from all of the cars. It may be objected that this would require pipes so large as to be cumbersome and unsightly, but when it is remembered that a difference of one pound in the pressure between the outside and the inside of the car is all that would be required; and that such difference in the pressure would cause the volume to pass through the pipes, theoretically spreading at the rate of about 96 feet per second, but practically at about 68 feet, the objection vanishes and the practicability becomes apparent. Another objection which is likely to arise is, that too much steam will be required; but as it is only when the engine is standing still that any is wanted for this purpose, this objection seems to be without foundation, and it is not probable that any railroad manager having the comfort of his patrons in view, would object to this plan on that account, and especially not until some more economical method is proposed. An instrument suitable for this purpose could be constructed in a measure similar to the Gifard Injector, and arranged so as to exhaust the air instead of compressing it.

The subject of warming cars, of which I now propose to say something, is so nearly allied to that of ventilation as to be properly called its twin brother. The objections which may be fairly urged against the present methods are not that there is not heat enough generated within the car, as a general rule, but that it is not properly distributed. An even temperature in all parts of a car is a desideratum with all persons who have occasion to travel in the winter. This desirable feature is believed to be practically attainable by the following or some similar means, namely, in the use of the double floor spoken of in treating of the first branch of this subject, and the admission of the heat between such floors and allowing it to pass into the car through numerous apertures distributed over the entire surface. It is a fact that can not have escaped the attention of the managers of roads and the traveling public, that the feet of the passengers suffer the most and first from the cold. It is clear that this plan would remove that difficulty. The heat to be thus distributed may be generated in any convenient place, either in the ends of the car or under it, or better yet, upon a separate carriage, and conveyed to the space between the floors by suitable conduits; but, wherever it is generated, it can never be so utilized until provision is made for its more equable distribution throughout the entire car. The reason for suggesting a separate carriage for the heat generating apparatus is, that by such means one prolific source of danger would be removed. I refer to the burning of cars by stoves when they upset. It is true, however, that heating devices may be placed in the ends of the cars and be rendered perfectly safe, and their arrangement may be such that the heat may be conducted down into the space between the floors. From what has been said it will be apparent that the kind of heating apparatus here described would aid the ventilating device in the performance of its functions, as all the air in the car would be heated, and consequently its tendency to rise and pass out would be increased; and as the quantity admitted would be subject to regulation, its temperature in the car could also be easily regulated.

It is believed that the importance of the subjects herein named can not be overestimated, and the writer has no doubt that a great part of the aversion to winter travel arises from the fact that too little attention is paid to them. It is a common thing on entering a car, even upon our best-regulated railroads, to meet such an atmosphere as the lungs refuse at first to receive, a second effort being required to bring them so perfectly under subjection to the will as to finally accept it. It is true that the adoption of the methods herein named would require a radical change in cars as now constructed, and it is admitted that such a change would be attended with increased expense; but I am not willing to admit that the managers of our railroads look only to the getting of the money of their patrons or that they are entirely, if at all, indifferent to their comfort; and even if this were the case, they, or the most of them, are men of too much sagacity not to perceive that the more the people travel the more profitable it is for the roads, and that the public will not travel by routes that are not provided with all attainable, or at least all reasonable conveniences. The correctness of this conclusion being admitted, it must follow that the reason why more attention is not given to these matters is, that the plans proposed have not been deemed of sufficient importance to justify a trial of them. If any suggestions contained in this article shall prove instrumental in awakening such attention, and in any way lead to the adoption of more improved and permanent devices for accomplishing the desired results, the object of the writer will have been accomplished.

Plumbago as a Lubricator.

It is well known that when the pressure on journals and other rubbing surfaces is excessive, the lubricating oil may be squeezed out, and the surfaces become abrased, as if there were no lubricator applied. In such cases it has been found that very fine plumbago will produce a smooth coating over the surface, by filling the pores and forming a layer of smooth material, not removable by mere pressure. In fact, the famous "anti-friction grease" consists of nothing more than grease and plumbago, and many other lubricating greases have been largely used which owe what special virtue they possess to the presence of finely-divided mineral carbon. Lately attention has been more and more directed to this material, the high rate at which machines are now driven continuously rendering more perfect lubricating agents necessary than those at present used. The chief difficulty, as regards graphite, has been to obtain it sufficiently pure and free from grit. The most noted sources of supply are the Barrowdale mines, Cumberland, those of Ceylon, of Ticonderoga, United States, and the Russian mines of Northeastern Siberia, where it occurs in immense masses. As found it is always more or less mixed with other minerals, such as granite, quartz, feldspar, calcite, etc., which, unless completely removed, of course render the graphite useless for lubricating purposes. Sir Benjamin Brodie's process does this very completely, and of late the mechanicians of the United States have largely availed themselves of it, obtaining thereby an anti-friction powder easy to use, not liable to waste away, and so far reducing the friction that it is stated that railway-cars fresh from the carriage-factory have been sent across the continent with the Pacific mail without the occurrence of a single hot journal.—*Manufacturer and Builder.*

The Friction of Journals.

THE *Scientific American* makes the following reply to a correspondent who asks whether the friction of a large journal is greater than that of a small one, the length and character of bearing being the same in both cases, and the number of revolutions the same, the only difference being in the diameter of the journal.

"The friction on any surface, whether plane or cylindrical, is proportional to the weight resting upon it, and is not at all affected by the area of the rubbing surface, provided the pressure is not so great, on the one hand, as to change the character of those surfaces, nor so light, on the other hand, as to make the resistance principally that of viscosity of the lubricant rather than that of true friction. In the former case, the friction may increase immensely in consequence of the cutting of the surfaces; and, in the latter, the increase of frictional resistance will be approximately proportional to the increase of area.

"The work done in any given time, that is, the power wasted in turning any journal on its bearings, is, where the frictional resistance is the same, proportional to the speed of the rubbing surfaces, since it is measured by the product of the resistance into the distance through which that resistance is overcome. Therefore, it follows that a very large journal absorbs a larger proportion of the driving-power of a machine than does one of small diameter, and in designing machinery we should make journals of as small diameter as possible without danger of breaking the shaft, or causing abrasion of the rubbing surfaces.

"Again, the tendency of a journal to heat is the greater, the greater the pressure per square inch of longitudinal section of the journal, and it is increased by increasing the speed of the rubbing surfaces. Therefore, to make journals safe against heating, make them of as small diameter as safety permits; and having thus reduced their absorption of power to the lowest limit, secure bearing surface by giving them ample length. If they are, however, made so long that the shaft can spring in the journal, heating may occur from that cause; in line-shafting this will, of course, not happen. The best practice gives line-shafting for mills a length of journal equal to four times the diameter of the shaft.

"In no case in general practice should the pressure, on even the slowest-moving journals, be allowed to exceed 1000 pounds per square inch of longitudinal section with steel journals, or about 600 on iron, running in well-worn boxes in each case. Special care should always be taken to provide for effective lubrication."

The Baltimore Car-Wheel Works.

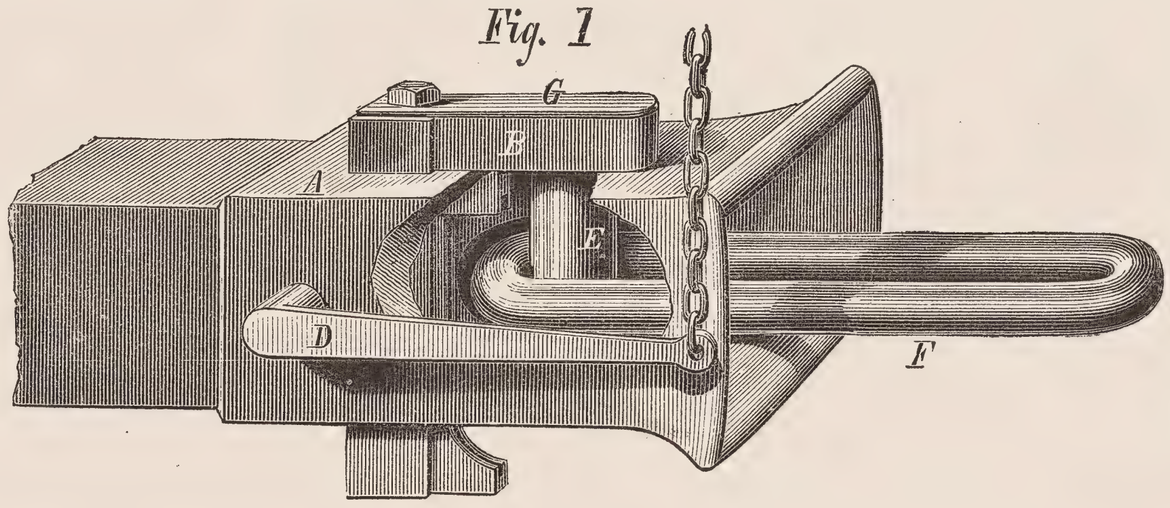
THIS, says the *Railroad Gazette*, is one of the new industries which have been revived in Baltimore within the past two years. The establishment has in that time been burnt out once, and since rebuilt and extended. It is conducted under the supervision of Mr. William J. Cochran, who for a long time was the foreman of the extensive foundry of the Baltimore and Ohio Railroad. The works of the Car-Wheel Company are located at Canton, which, as many of our readers know, is the name given to the extreme eastern section of Baltimore. The foundry is 148 x 45 feet, and has three cupolas with a capacity for making one hundred wheels per day. It has five double cranes, that is, cranes with two jibs attached to one post. Twenty wheels can be moulded to each of these cranes. A track is laid the whole length of the foundry with a large reservoir mounted on a small car. This is filled with the melted iron from the cupola, and is moved to each crane and group of wheels, which are poured with ladles filled from the reservoir.

The wheels, after the iron has set, are carried to annealing pits, which are patented by Mr. Cochran, and have already been described in these pages. Twenty-four of these pits are located at one end of the foundry.

This establishment is also provided with tools and machinery for fitting up wheels and axles, and doing other machine work. It is believed that a car-building shop will soon be erected near the foundry, which will increase the demand for wheels. At the present time, the Baltimore and Ohio Railroad is the largest purchaser of wheels, but the Seaboard and Roanoke and Western Maryland Railroads have also been supplied. An order from one of the Paterson locomotive works has also been entered recently, so that the demand is extending.

Maryland and Virginia iron is used in the manufacture of these wheels, and which has been very successfully employed for many years in the foundry of the Baltimore and Ohio Railroad.

Fig. 1



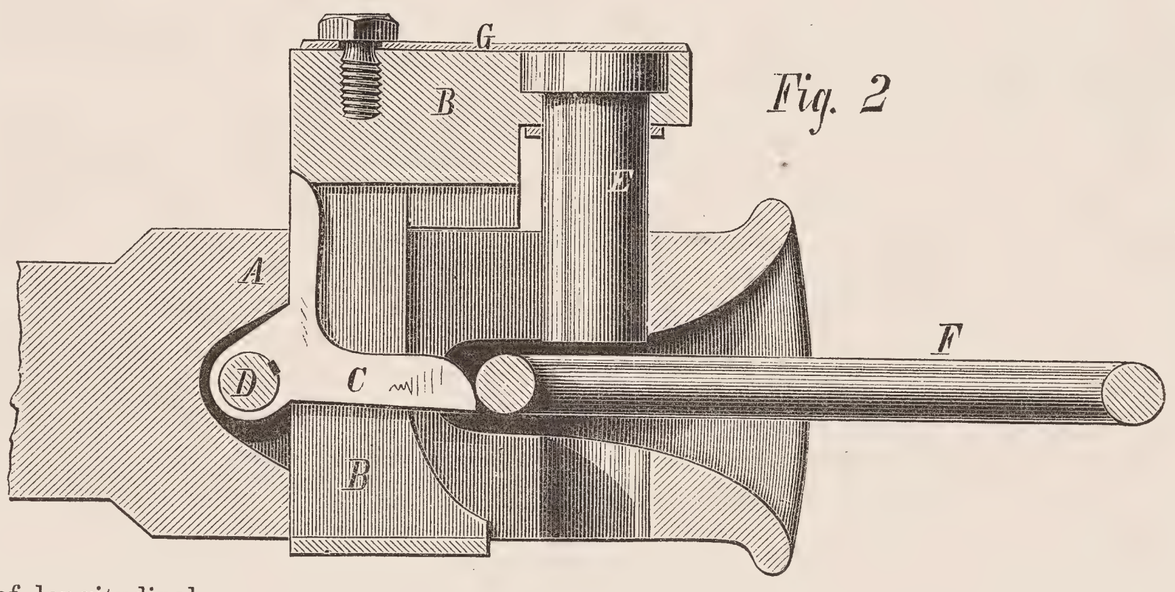


Fig. 2

New Station in Boston.

AN exchange says, "The new train-house of the Boston and Providence depot, in the former city, is to be 600 feet long, 126 wide, and about 70 high. The end walls are to be of brick, about 32 inches thick, with strengthening buttresses to give it stability. The central opening where the trains enter and leave will be a clear, unobstructed entrance of about 70 feet width, above which will be an ornamental mammoth window. Two smaller openings each side of the main entrance will give other means of outlet. The roof will be supported by twenty-three heavy wrought-iron ribs or arches, similar in design to the Lowell depot, but not quite so high above the platform. These arches stand upon heavy cast-iron shoes, upon which they hinge, as they expand and contract by changes of temperature. The thrust of the arches is resisted by the heavy granite masonry, which looks solid enough to hold a mountain, and has been built especially to resist horizontal thrusts. It stands upon a large number of piles. Between the main arches is a system of purlins and wind-ties, also of wrought-iron. The intermediate rafters resting upon the purlins are of planed timber, upon which is laid a thickness of pine sheathing planed on the under side, and tongued and grooved and beaded. It is lighted by a double row of glass windows running the entire length of the train-house, and there being no 'lean to' on the sides, each side wall, which is of brick and about twenty-five feet high, will be pierced with windows of an ornamental design. Surmounting the train-house is to be a monitor ventilator the entire length, and the whole exterior roof is to be slated. The hack, express, and baggage accommodations are all to be worthy of the building."

Improved Self Car-Coupler.

THIS is an effective and simple device for automatic coupling, so arranged as to preclude the necessity of a man going between the cars. No springs or intricate machinery are used; it is impossible for the pin to be thrown out by any jarring or wrenching of the train, and the apparatus can be readily substituted for the old-fashioned coupling without necessitating the removal of the latter.

Fig. 1 is a perspective view of the invention, and Fig. 2 a sectional view, the former showing portions broken away.

A is the bumper, in the rear part of which works a slotted bar B. C is a bell-crank keyed to a horizontal shaft D, which passes through the bumper in rear of the bar B. Through an orifice in the upper horizontal portion of the latter the pin E passes. This pin is of any ordinary description, and its head is counter-sunk in its support. G is a plate attached to the bar B, and arranged to turn over the head of the coupling-pin in order to prevent it from being jolted or otherwise thrown out.

Fig. 2 shows the device arranged for operation. By elevating the lever, shown on the outer end of the shaft D, the bell-crank C, which works in the slot in the vertical portion of the bar B, is turned so that one of the arms comes in contact with said bar and raises it. By this means the pin E is also lifted clear of the link opening. While one arm of the bell-crank C is engaged in supporting the bar B, the other arm projects into the rear of the opening in the bumper. The upper portion of the last-mentioned arm, it will be noticed from the engraving, is curved or beveled. As the link F enters the bumper, it strikes this curved end of the horizontal arm. Acting thereon, it forces the latter downward, thus moving forward at the same time the vertical arm. The bar B being no longer supported, falls and carries with it the pin, which passes through the link and locks the coupling. In this position the bar is shown in Fig. 1.

The chain on the lever which actuates the shaft D may be carried to any convenient point, so that by thus actuating the lever the car can be instantly uncoupled at any moment. After the link is once forced in and engaged, it does not press any thing but the solid iron of the bumper, and is not in contact with the lower part of the bell-crank. The bar B is locked by the bell-crank in whatever position it may be in, and by its weight holds the lever perfectly level. This coupling, it is claimed, will always operate even on the sharpest curves. If it should get out of order it may still be employed in the ordinary manner, the pin E being inserted by hand

The coupling is the invention of Mr. M. Disney, of California, patented through the agency of Messrs. Munn & Co., publishers of the *Scientific American*. Further information may be obtained by addressing Mr. H. C. Kibbe, 419 California st., San Francisco, Cal.

Lake Shore and Michigan Southern Railway Palace Sleeping-Coaches.

Two very superior palace sleeping-coaches have recently been built at the Cleveland shops of this company. They are named respectively "Madison" and "Geneva," and in design and workmanship surpass any thing of the kind which has hitherto been produced at these shops; indeed, we may venture to say that, as specimens of first-class passenger rolling-stock, they approach as near to perfection as could be expected from the best resources of skill and experience. Having availed ourselves of an opportunity to inspect them just before they were ready for the track, we will give our readers some of the leading features of their construction.

The two are so nearly alike that a description of one will answer for both. The dimensions from inside of posts are 56 feet by 8 feet 11 inches. The interior is divided into seven sections measuring 6 feet 1 inch from centre to centre of each, affording ample room for four persons to a section when used as a day-car. There is a lobby at each end, in one of which are the wash-room, linen locker, and water-closet, and in the other the ladies' saloon, baggage-room, and a recess containing a Baker & Smith heater. The wood-work of the inside is particularly noteworthy, as it is entirely of solid mahogany purchased from the importers specially for these cars, and selected, as regards the quality, with a care and judgment not always exercised in such cases by railway purchasing agents. Some of the panels are equal to the best veneering in grain and finish, and would be mistaken for it by ordinary observers. The bottoms of the upper berths are panel-work, instead of painted canvas. The wood-carving is very beautiful and elaborate in design and execution, and exhibits a degree of artistic skill which shows that this feature of interior decoration is capable of much greater development than it has yet reached. Two specimens of this work may be taken as a sample of the rest. They are placed just over each door leading from the lobbies to the central part of the car, and represent the Goddess of Night with a watch-dog on each side, the whole surrounded with a wreath of poppies and lilies—the entire group being suggestive and emblematic of the special uses of the car. On each cross car line is a carved bell-cord bracket in the form of a bouquet of flowers. These and the other specimens of wood-carving to be found in the interior were all made at the shops of the company. The upholstery is similar to that of the cars previously turned out by these shops. The floor has a heavy Wilton carpet, with colors and figures harmonizing with the wood-work and upholstery. The head-lining is a highly elaborate piece of work of much artistic merit, but does not altogether match the surroundings, owing to an excess of bright colors. A better tone would have been secured by a freer use of neutral tints. This is getting to be understood more and more by painters of head-linings. The roof, and in fact every part of the interior ornamentation of cars of this class, should not be made so conspicuous, in color or otherwise, as to present any marked or noticeable contrast as compared with any other part. There is unity in variety, but every thing depends on the nature of the combination. Each central section of the car has a beautiful bronze chandelier, and the lobbies are provided with German student-lamps, with reflectors that are very effective in augmenting the light.

The painting of the outside of these cars is quite different in style from any thing now on the road, and, while fresh and bright with varnish, has a very attractive appearance. The design is something similar to the Wagner sleeping-car, with several original improvements. The body-color is chrome-yellow, and the letter-board and skirt around the platform roof is wine-color. The lettering reads "Gates' South Shore Sleeping car Line," with "New-York and Chicago" in smaller letters in a scroll at each end of the main lettering. In the centre of the sides and below the windows is a large oval panel of the same color as the letter-board, in which the name of the car is inserted, surrounded with a beautiful scroll in gold-leaf. The corners and door-posts are also wine-color, in order to display the elaborate ornamental work for which the "boss-painter" has a commendable weakness, or rather partiality. The remainder of the wood-work projecting past the panels, such as window-belts, circle-headings and mouldings, are painted green, which to the reader may seem like an odd freak of fancy; when seen, however, the whole combination makes a very favorable impression, and the judgment displayed in the distribution and choice of colors is very apparent.

Without going into a more detailed description of these vehicles, we can not refrain from saying that great credit is due to the master car-builder of these shops, Mr. James Withyecombe, and to Mr. John Kirby, the general master car-builder of the road, and to their subordinates and assistants, for turning out such admirable specimens of rolling stock; especially so, as the work is done in shops where the facilities for constructing cars of this class are quite inferior as compared with other shops where such work is done. The erecting and wood-working machinery shop is one and the same, which would strike most car-builders as a bad arrangement. The buildings are just as they were twenty years ago, with no additions to correspond with the great increase in the traffic and car equipment of the road during that time. The paint-shop is an inferior structure, without sufficient light or ventilation. The passenger-cars are all finished here, and the material has to be brought by hand from the cabinet-shop across two main and five side tracks to the paint-shop, the tracks being almost invariably occupied with cars. Yet, with these manifest drawbacks, the majority of the magnificent sleeping-coaches of this road, and which are universally admired, have been built at these shops. There can hardly be a question that equally good work could be turned out with much greater economy and dispatch if the facilities for doing it were better than they now are.

In connection with the foregoing, and as a sort of appendix thereto, we here take occasion to refer to a defect which exists in these and all sleeping-cars, so far as we know from our own experience. There is no adequate provision made for ventilating and lighting the upper berth. In the cars we have described, the upper sash or part of the windows above the line of this berth is paneled over inside; and although in the Pullman cars they are not paneled, the sash is nevertheless stationary, and can not be used to admit the air. The way to remedy this is to make the upper sash movable so as to slide up to the plate of the car, in which case it would not interfere with the working of the lower sash. Most sleeping-cars have two windows to each section, so that one could in such case be used by the occupant of each berth, provided the porter, when making up the berths, invariably fastened one of the lower sashes. The occupant of each berth could regulate the ventilation to suit himself, while the division bounds between the sections would prevent any inconvenience to those in the adjoining section.

This matter may be illustrated by relating a little experience of our own. During one of the heated terms last summer, we were riding on a Western road in a first-class model Pullman sleeper, in company with a friend. Our previous experience had taught us to keep out of the upper berth, and our friend had also learned the same lesson, whereupon it became necessary to resort to "heads you win, tails I lose" for the lower berth. We lost, as usual, and went "up-stairs." The result was a night of misery, with not more than an hour's sleep. There was no ventilation except through the ventilator sash in the raised roof. This was open, and, not being protected by wire-cloth on the outside, the sparks and cinders rained in on us all night. Our friend in the lower berth slept comfortably because he could raise the window-sash to any desired height and have plenty of air. This is not only our experience, but that of many others, and it is to be hoped the evil will be remedied in the way we have suggested, or in some other way, so as to silence complaint and abate one of the discomforts of traveling.

The Floor-Framing of Cars.

BY W. E. PARTRIDGE.

THE floor-framing of a car is one of the most important points in its construction, since upon this depends, in a great measure, its durability in ordinary service, and its ability to withstand the concussions and strains to which it is subjected in case of accident. It becomes, therefore, very desirable to examine and compare the different methods, so far as we are able, and point out the advantages of each.

On most roads the floor-timbers of cars have very little to do with carrying the load, which is sustained chiefly by the truss-rods and the bracing or trussing in the walls. Their primary office is, therefore, to resist the longitudinal strains; hence, we need to transmit, as nearly as possible in a straight line, the strain from one draw-bar to another. It is of the utmost importance in buffing that the blows be received directly upon the ends of the timbers without any deflection. These endwise blows or strains are frequently not on a line parallel with the longitudinal timbers. The corners receive a good share of them, and perhaps more of the severest shocks than the centre sills. The corner bracing, also, though entirely neglected on some roads, is exceedingly important, and has received a good deal of attention.

Besides the strains which are of ordinary occurrence, there are others which occur more rarely, but must be provided against, even though not one car in twenty actually receives them. Among these are dragging upon the track or ground; falling or striking upon a corner; upward blows upon the end, as when a car drops from its truck upon the track or falls from a bridge. Side-strains from rolling over and over, or an upward blow of sufficient force to lift the car into the air, are contingencies which may and do happen, and no car-builder of established reputation would fail to provide for them in his plans of construction. In securing these ends he can also, without extra expense or labor, keep out both the noise of the wheels and the cold.

Car-builders in this country may be divided into two classes, in regard to methods of floor-framing—those who dispose the main timbers longitudinally, and those who place the greater part of them cross-wise. This latter method is also varied in practice, some using lines of blocking down to the centre, to prolong or carry the strain from end to end, and others depending entirely upon the side or outer sills to do this. When the blocking is used, it is generally driven in between the timbers with a sledge, and spiked fast with large nails. Cross-framing is not needed in the long style of cars now built, because in practice it is found that the two transoms and the cross-tie planks under the centre are amply sufficient to prevent the sides from getting down. The real tendency of a loaded car is to become depressed in the centre—not the centre of the floor merely, but the entire width, including the walls. That it is useless to put in cross-framing is very evident, when the load is taken into account. This is estimated at about 23 pounds per square foot, or, in an ordinary car, say about 207 pounds to each foot of length—a weight so small that the flooring alone is able to sustain it, even if there were no centre-sills. This proves that the actual load does not require the large sticks put into the floor-framing as a needed support of themselves, but to form the "compression member," rather, in a very flat truss, whose own weight is by far its greatest load. The average 60-passenger car weighs upward of 40,000 pounds, yet its load, when filled, rarely if ever reaches 12,000 pounds or less than one third of its weight when empty.

In the size of timbers used there is a remarkable uniformity in practice, which, however, does not prove that these sizes are the best, but quite the contrary, for we find that the 50 and 54-foot cars have precisely the same sticks in their flooring that the

45-foot cars have. In a 48-foot car, for instance, we have found outside sills 5½ x 8, and centre ones 4½ x 7½; in a 50-foot car, outside sills 5 x 8½, and no long inside sills; on another road, a 45-foot car had outside sills 5 x 8, and none inside; another car, 52 feet long, had six long sills, the two outside ones 5 x 8, and the inside ones 5 x 7. In still another case we found a 68-passenger car, 50 feet long, with sills 6 x 8½, and a car 51 feet long, with four sills 3 x 7½. The weight of these cars ranged from 34,000 to 48,000 pounds, the shortest being, in some instances, quite as heavy as the longer ones. There seemed to be no ratio of weight and size of sills; the number of truss-rods was by no means fixed, some builders using none, others using four, and depending on them to carry the load, while others make the car self-supporting, and use the rods as a sort of margin for safety. This diversity in practice is an evidence that the problem, as to how the requisite degree of strength can be obtained from the smallest weight of material, has not yet been satisfactorily solved.

On roads where side-bearings are or have been used, much attention has been given to diagonal bracing of floors, and deservedly so. Car-corners are exposed to severe strains, and special provision must be made for their protection, or the body of the car will be seriously injured. In the short European cars the main strength is derived from this kind of bracing, as shown in Fig. 1, where the actual support of the car is due as much to this as to the side-sills. Fig. 2 shows a plan used on another style of short wagon, and is similar to the braces on the Harlem Railroad passenger-cars. Fig. 3. illustrates those on the Paris and Versailles road, in France, and are longer than those of Fig. 2. The diagonals are notched into each other, and an iron plate, as shown, placed on top of each stick, under the bolt-heads. This, for a short car, makes a very effective framing. There is, however, a serious lack of longitudinal strength when the same plan is applied to the long cars of this country—even those used for freight. The diagonals are sometimes halved into each other so that their tops are flush, in which case a piece of iron shaped like an X is bolted on the top, as shown in Fig. 4—a plan that has been used on the London and Birmingham road, on cars designed to carry three horses. On the Paris and Rouen road, the diagonal timbers are arranged as shown in Fig. 5, where one of them runs from corner to corner, while the other is cut in two, and the ends seated in slips cut into the long one. Either of these plans gives great stiffness to the floor-frame, so that the car can not be got out of square by any usage short of its virtual destruction.

Fig. 1.

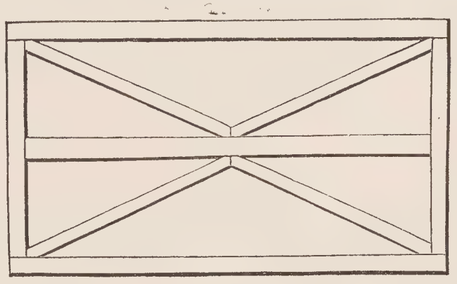


Fig. 2.

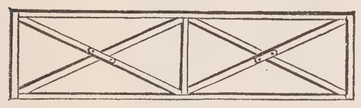


Fig. 3.

Fig. 4.

In some cases where a transom has been placed beneath the sills, or where it projects considerably below them, the plan represented in Fig. 6 has been employed. This could, apparently, be used to great advantage on the lower transoms of passenger-coaches, but more especially upon freight-cars. An iron strap goes under the whole and makes all fast. These chocks are the width of the sill, and deep enough at the thick end to be flush with the under side of the transom. A stick two feet long would probably make them both, without waste, when the cross-piece is not too deep. This would materially lessen freight-repair bills. The sills in the cut are represented as ending in the transom; this was the practice in Europe at one time.

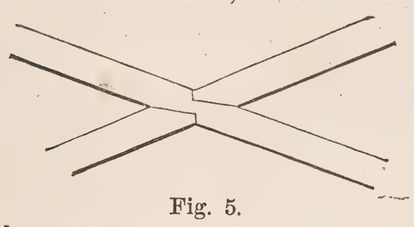


Fig. 5.

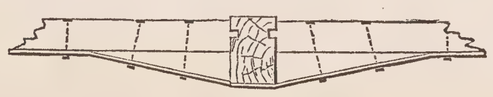


Fig. 6.

Axles, Journal-Bearings, and Oil-Boxes.

THE following is the report of the committee appointed at the last annual meeting of the Master Car-Builders' Association, to obtain information on the above-named subjects, and have their report published in THE NATIONAL CAR-BUILDER and *Railroad Gazette*, at least three months previous to the next annual meeting:

REPORT.

To the Master Car Builders' Association:

GENTLEMEN: Your committee, appointed at the last annual convention of the Association, held in the city of St. Louis, and to which was assigned the duty of collecting information in regard to railway axles, oil-boxes, and journal-bearings, with the view of determining the most suitable form and size of the same to be adopted as a uniform standard by all railroads, beg leave respectfully to report:

That for the purpose of obtaining such information from the most reliable sources, your committee have sent circulars as far as practicable to all master car-builders and master mechanics connected with the car departments of railroads, and have received replies from the majority of those to whom such circulars were sent, accompanied in some cases with descriptions of practical tests made of different sized journals, and recommending the adoption of a larger journal and oil-box than are now generally used; although in some of the replies the size and kind of oil-box used by the roads with which the parties are connected, are given with the statement that they were satisfactory. It is to be remarked, however, that all the reports received from parties connected with the large trunk-lines favor an increased size of axle and journal-box, while the reports which favor the present size are from parties connected with smaller roads.

Your committee, after a careful investigation of the subject, have arrived at the conclusion that a larger axle, a longer and larger journal, and of course larger oil-boxes, are desirable. In coming to this conclusion, they have given greater heed to the reports received from the leading trunk lines of road throughout the country, for the reason that such lines use a much larger number and a greater variety of cars than the smaller and branch lines, and therefore the observation and experience of those who have charge of the car repairs on the long lines have more value than that of master car-builders whose opportunities of comparing their own cars with those of other roads is necessarily more limited.

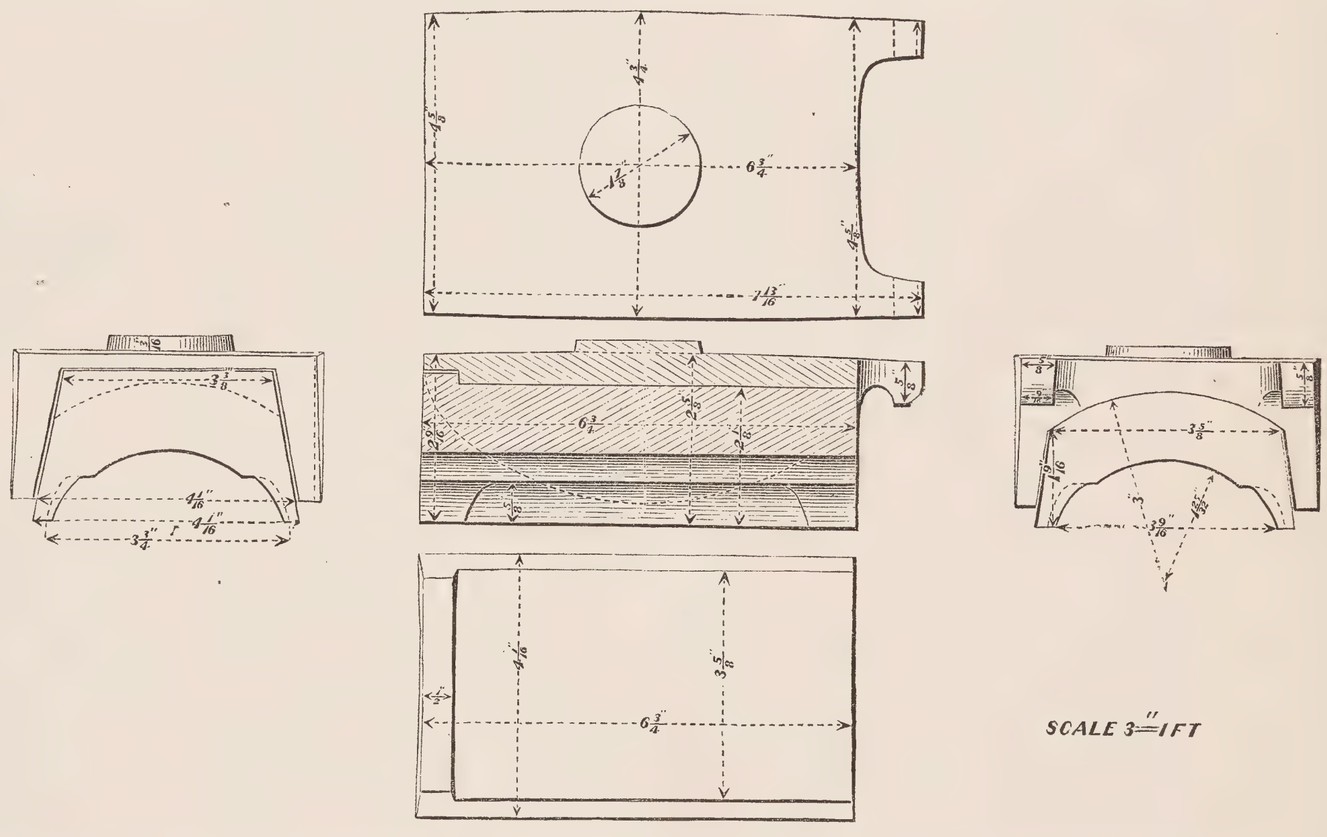
Your committee are of opinion that an increase in the size of the parts named would be a very great advantage to all roads, and this in a great variety of ways. A large axle would tend to lessen its liability to break; an increase in the length and diameter of journals would distribute the friction over a larger surface, facilitate the lubrication, and avoid delays by hot boxes - a source of very frequent annoyance and trouble. A uniform system once adopted and adhered to by every road, would diminish the aggregate cost of repairs very materially. Other arguments in favor of a standard system might be urged by your committee, but the leading points above indicated will, in our judgment, be sufficient to convince all practical railroad men of the great benefit to be derived from its adoption.

Guided by the best information to be obtained from the most experienced and practical railway mechanics of the country, your committee would therefore recommend, and strongly urge the association to adopt, the following specified sizes of journals and axles for all new work, both for passenger and freight service, and also for old cars as far as practicable:

Length of axle, between outside collars, 6 ft. 10 in.
Thickness of collars, ⅝ inch.
Diameter of axle at wheel-seat, 4½ inches.
Diameter of axle at centre, 4 inches.
Length of journal, 7 inches.
Diameter of journal, 3½ inches.

We would also recommend an oil-box with a uniform journal-bearing and key, as represented in the accompanying cut, making one uniform core-box for all trucks, whether iron or wood, with jaw or without. All of which is respectfully submitted.

F. D. ADAMS, Boston and Albany R. R.
D. HOIT, Toledo, Wabash, and Western R. R.
JOHN KIRBY, Lake Shore and Michigan Southern R. R.



THE Rutland, Vt., *Herald* speaks of an elegant new passenger-car recently built at the shops of the Vermont Central Railroad at that place, of which Mr. F. W. Sessions is the master car-builder. The car is 48 feet long, finished inside with Hungarian ash and black walnut, is handsomely upholstered, runs on four-wheeled trucks, and presents a beautiful outside appearance. The car made its trial trip with a new locomotive built at the shops of the company, under the supervision of Mr. N. L. Davis, the master mechanic, and named the "Brattleboro." Both car and engine are to run on the express train between Rutland and Burlington.

AN accident recently occurred on the New-York Elevated Railroad, caused by the bursting of a feed pipe which let the steam escape from the boiler and brought the train to halt at a point where there was no platform. The passengers reached the ground, a distance of twenty feet, by a ladder.

Uniformity of Axles, Oil-Boxes, and Journal-Bearings.

EDITOR OF THE NATIONAL CAR-BUILDER:

DEAR SIR: I notice from the tenor of sundry articles in your valuable paper that the master car-builders are making an effort to bring about a uniformity in the size of axles, oil-boxes, and journal-bearings. This is a movement in the right direction, and I can not but think that if the managers of our leading lines of railroads can be induced to give the subject the attention it deserves, they will appreciate its importance and sustain the effort now being made, by giving it their encouragement and approval. Every practical railroad man, who is at all familiar with the interchange of cars, knows too well how much additional expense is incurred in consequence of the different sizes of the truck-fixtures above named. A great expenditure of time and labor is unavoidable under the present system—or, rather, no system—in making new patterns, or in hunting up something to fit in each particular case, to say nothing of the delay in forwarding time-freight, and the cost incidental thereto.

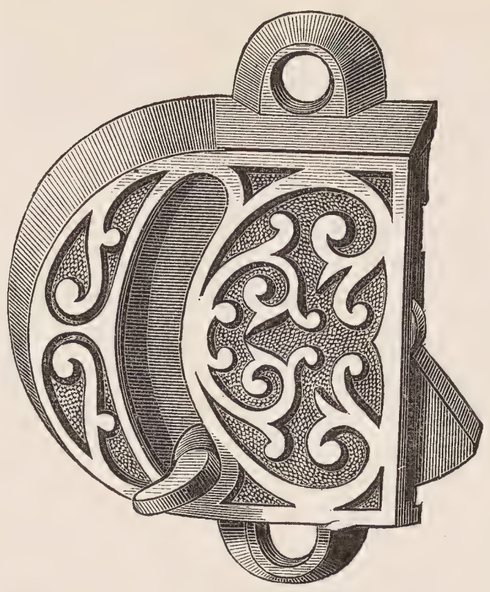
It is also very obvious to most railroad mechanics that the axles and journals now in use are too small for the weight they are required to carry, and the long distances run, causing delays by heating and breaking; all of which would, in my judgment, be to a great extent avoided if the axle were increased to a proper size and the journal had more lubricating surface, for the smaller this surface is in proportion to the weight resting upon it, the greater is the friction; but if the surface is increased so that the friction will be distributed as fast as generated, the bearing will not get hot. This principle is conceded, I believe, by almost every one who is practically familiar with the running of journals. This would certainly obviate a difficulty which exists more or less on all roads; and, as regards axles, an increase in their size would lessen in a corresponding degree their liability to break. These considerations are sufficient to warrant a change of the present system to one of greater uniformity, and, if the uniformity could be made general in its application to all roads, it would lessen the expense of repairs to an extent which is probably better understood by those who have such repairs to look after than by any one else.

Much more might be said in favor of this much-needed change, but it is unnecessary to enumerate the many incidental advantages which will readily occur to every one who gives the matter a careful consideration. Indeed, there does not appear to be any valid argument against it. It may be said that this proposed change will compel the roads to throw away their present equipment of running fixtures. There is no necessity for doing so, however; only let it be understood that as soon as the master car-builders shall agree upon a uniform standard of sizes, all new work shall thereafter be made to conform to such standard, the old stock in the mean time wearing itself out, and in a few years disappearing altogether.

This is the whole case briefly stated. The subject is one of such importance as to demand the serious attention of railroad managers. If there are any valid objections to the proposed change, I hope to see them stated in your journal before the next annual meeting of the Master Car-builders' Association; and I trust that the superintendents and managers of our roads who approve of the measure, will give it encouragement and aid by attending such meeting, which will be held in Boston next June. The leading object of the association is to improve the rolling stock of the roads represented by its members, so as to secure the utmost economy and safety in their operation, and in promoting this object we need the coöperation and influence of all concerned. A MEMBER.

WILLIAM B. GAGE, master mechanic of the Rensselaer and Saratoga Railroad, died suddenly at Green sland, on the 24th ult.

Improved Window-Sash Lock.



THE cut illustrates an improved automatic, reverse-locking sash-holder, recently patented by Eccleston & Platt, of Oxford, Chenango County, N. Y. It is especially adapted to car-windows, and will support the sash in any desired position when raised, and fasten it when closed. It is simple in construction, easy in its working, and effective and sure in its action. A traveling-spring throws the bolt either way from the centre, by the direct action of which the sash is held. Frictional resistance of the spring is avoided in raising or lowering the window, and a fixed bearing-spring is also dispensed with. While raising or lowering the sash, the bolt does not have to be held away from the frame. The reader is referred to the advertisement of the proprietors on page 70.

Chicago and North-western Shops.

THE machine and construction shops of the Chicago and North-western Railway are shortly to be removed from Chicago to the town of Cicero, a few miles from the city, where they will be very much enlarged, and made adequate for the manufacture of all the rolling stock of the road. Plans are now being prepared for the immediate construction of a machine-shop 120x552 feet, with a boiler-shop 140x200 feet, and a blacksmith-shop 80x300 feet, attached. Between the two latter, which will project from the machine-shop, two round-houses will be erected, with stalls for eighty engines—forty in each. As one turn-table is required to move each engine in a round-house, and several may have steam up and be wanted on short notice, a larger number of stalls would not be so convenient. The erection of the machine-shop and engine-houses will be commenced early this spring. Materials for the foundation are now being quarried. The superstructure will be of brick. The machine-shop will be provided with every facility for the construction as well as the repair of locomotives. In addition, car-shops and their necessary adjuncts are projected. These are to be located west of the works before described. The main building will be 280x80 feet, with two rectangular wings 24x80 feet, leaving an intervening space 240x120 feet. In these buildings the requisites for constructing passenger and freight-cars will be placed. Adjoining will be the engine-room, 80x160 feet; also the paint-shop, 80x200 feet; the foundry, 100x200 feet, and the store-room, 50x300 feet.

A Railroad Hotel.

THE Baltimore and Ohio Railroad Company are erecting several new hotels and eating-houses at various points on their line of road, all of which will be under the control of the company. The hotel at Cumberland, called the "Queen City," was commenced in July, 1871, and is now completed. It is a large and commodious structure, built of Baltimore pressed brick. The windows have iron caps and balconies. An ornamental piazza, 10½ feet wide, extends around the front and ends, giving a promenade of 400 feet.

The centre building (140.8 front) is two stories high, surmounted by a lofty cupola, from which is obtained a magnificent view of the city and surrounding country. This part of the building contains the dining-room, 140 by 33 feet, which will seat some four hundred people. It is entered by three doors on the front piazza, as well as from each end, and is being frescoed in the best style of the art, above the walnut wainscoting. The wings, 47 by 84 feet, are four stories high, and contain: in the northern one, the ticket office, hotel office, and gentlemen's parlor, with wash-room and water-closets for same; and in the southern wing are the ladies' waiting-room and two parlors, with wash-room and water-closets. The back building, 38 by 97 feet, three stories high, contains the kitchen, bakery, pantries, etc. The floors above the first story contain two private parlors, besides ninety-three double and single rooms, with bath-rooms and water-closets in each wing, communicating with the porches and the rear. A lofty and well-lighted basement extends under the whole building, which will be used for a restaurant, billiard-room, barber-shop, wash-house, laundry, and cellars for storage and fuel.

The building is heated by steam, provided by two large tubular boilers placed in a boiler-house 28 feet by 35 feet, three stories in height. The upper stories of this building will be used for servants.

The platform, sixty feet wide in front of the hotel, is being paved with the Schillinger cement pavement, which has been thoroughly tested in the Northern cities, and found as durable as the natural stone. It is laid in square blocks, with circular plots for grass and trees, protected by a curb of the same material.

Rare Cabinet-Work.

WHILE visiting the car-shops of the Boston and Albany Railroad at Springfield, not long since, we were shown some remarkable specimens of cabinet-work, the productions of Mr. Frederick Hazen, an employee in the passenger-car department. They consisted of a table, carpenter's tool-chest, and a small secretary for books, inlaid with an immense variety of woods, including almost every attainable kind, from the common currant and gooseberry of the gardens to the rare and valuable specimens from Africa, Australia, and other distant regions of the earth. The secretary alone contains no less than 21,000 pieces of various forms and sizes, some of them being but a little larger than a good-sized pin-head, and all fitted to their places with such accuracy as to appear like one continuous piece. One of the ends of the secretary is finished exclusively with the different varieties of oak, and is very rich and beautiful in appearance, each piece being diamond-shaped, and placed so that the grain runs in a different direction from that of the adjoining ones. On the fronts of the drawers are several ornaments of appropriate design, and made up of black and white squares less than the sixteenth of an inch in size. The table, chest, and secretary are of a corresponding style, and present the same general features in their workmanship. Many of the pieces of wood are interesting souvenirs, being portions of famous ships, trees, or associated with battles or other historical events. No attempt has been made at any other ornamentation than merely putting the woods together in various combinations and patterns, and this has been done with such unwearied and painstaking care, combined with natural aptitude and skill, that the result is a genuine piece of art so complete as to conceal the art. Mr. Hazen is an expert in whatever pertains to fine cabinet-work, and his services are valuable in the finishing of passenger-cars, in which there is always some fine work which can only be done well by expert and practiced hands.

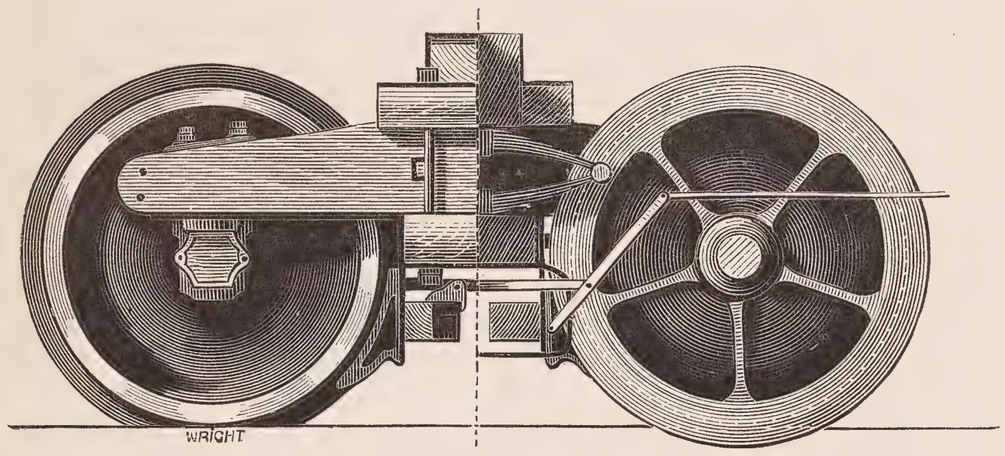
These elaborate and beautiful specimens are the product of Mr. Hazen's spare hours for many months. He has received numerous liberal offers for them from parties desiring to purchase; but he has declined them all, as he prefers to retain the articles for household ornaments, doubly valuable as being the productions of his own labor, rather than part with them for money.

MR. JACKSON RICHARDS, master mechanic of the Philadelphia, Germantown and Norristown road, was recently presented with a valuable gold watch and chain by the enginemen and firemen on the road.

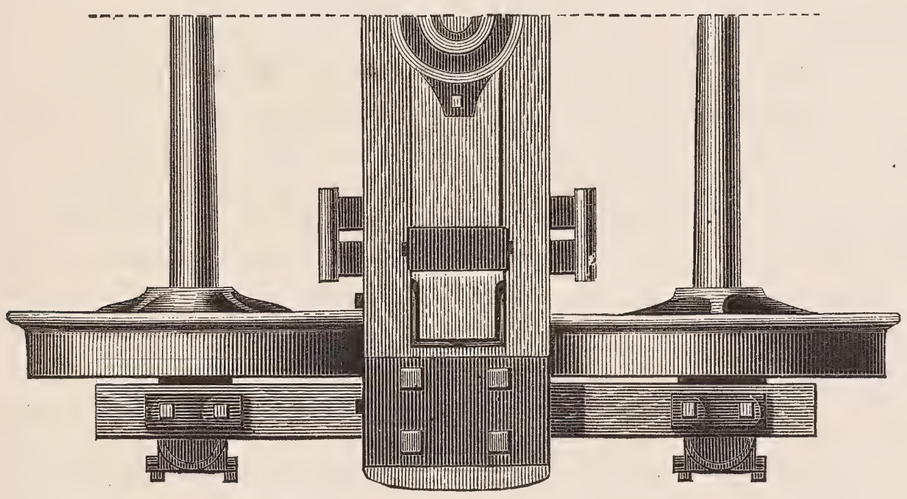
THE new freight depot of the Boston and Albany road at Worcester is 470 feet long by 60 wide, and nearly completed.

Baltimore and Ohio Freight-Car Truck.

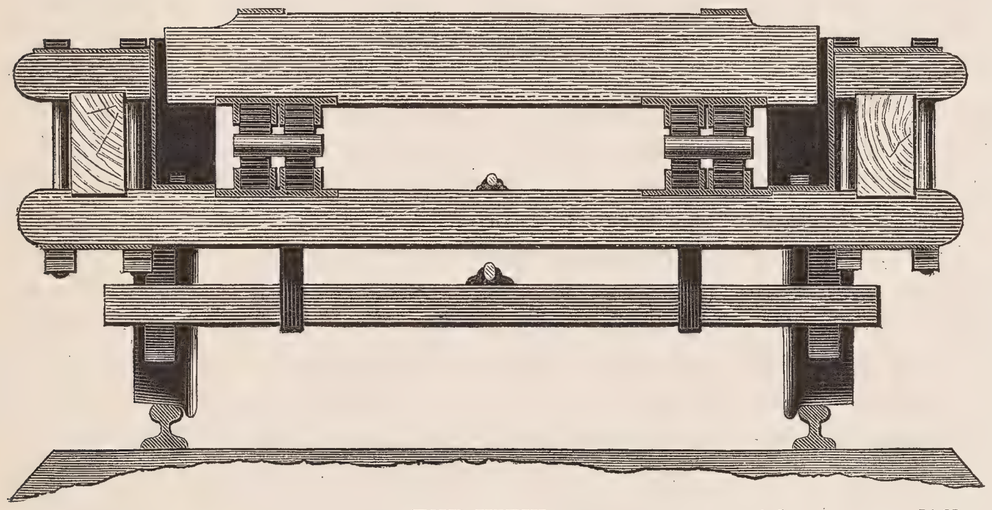
THE engravings represent a side elevation, plan, and sectional end-view of the standard freight-car truck used on the Baltimore and Ohio Railroad, to which we briefly alluded in the notice of the car department of the Mt. Clare shops in our last issue. The peculiarities of its construction are so clearly shown in the illustrations, that little or no description is necessary. No journal-springs are used, those on the bolster affording the necessary elasticity. The brakes, it will be observed, are placed between the wheels and are worked by a lever, as shown in the half side section view.



SIDE ELEVATION.



PLAN.



END-VIEW.

This style of truck has been very extensively used by the road, and has proved to be both cheap and durable. The frame being, with the exception of the bolts, entirely of wood, its cost is considerably less than that of an iron truck, and, when made of well seasoned timber, it is said to wear quite as well.

The engravings are to a scale of half an inch to a foot, and sufficiently accurate for measurements to be made from them.

THE new car-shops of the Pittsburg, Fort Wayne, and Chicago Railroad, at Allegheny Pa., are now finished and the machinery is being put in. The buildings are of brick, and two stories high. The main structure is 80 x 216, with two wings 80 x 125 each. The wings have each 11 tracks, with room for 22 coaches or 44 freight-cars. The shops will be ready to begin work by the 15th of March.

THE Westinghouse air-brake is now running on two thousand trains and on one hundred railroads in this country. It is also being put on the Belgian roads, and on the road from Vera Cruz to Mexico.

New Street-Car Motor.

THE Philadelphia *Ledger* says that an experiment was recently made on one of the street lines of that city with Lamm's fireless street locomotive, now in use on one of the street railways in New-Orleans. The locomotive used was built for the experiment, weighs five tons, has two cylinders 6 inches in diameter and 12 inches stroke, and a tank 12 feet long by 37 inches in diameter. The difference between the new motor and the ordinary dummy is, that the latter have fire-boxes and boilers, and the new invention dispenses with both, and substitutes therefor a tank, which is first partly filled with water and then filled with steam, transferred to it by appropriate apparatus from a stationary steam generator at the terminus of the road. The steam thus stored in the tank furnishes the motive power of the engine until the locomotive returns to the generator, and the tank is refilled, or until it reaches another generator on the road. The tank is covered with heavy layers of felt to prevent condensation. A tube connected with the stationary steam generator passes through the lower part of the tank, and is perforated with small holes, four inches apart, the apertures being turned downward, and their total area being equal to that of a cross section of the tube. A pipe is connected with the engine and thence by crank or gearing power is transferred to the driving-wheels. The tank is partially filled with water, the steam introduced through the perforated tube, thus warming all the water at once, and, the desired pressure having been obtained, the locomotive is disconnected from the steam generator and is ready for service. The water in the tank does not have to be removed, and it requires only five minutes to charge the tank with steam.

The locomotive, with a car attached, left the depot at twenty minutes of one o'clock with 176½ pounds' pressure. The tracks were slippery with snow, but the engine carried the car up the heavy grades of the road and around the double curve at Adams street without any difficulty. After waiting about fifteen minutes at the Frankford terminus, the locomotive started on the return trip, arriving at the depot at twenty minutes of two o'clock. The distance traveled on the round trip was six miles and a quarter. 76 pounds of steam were used on the up-trip, and the engine reached the depot with 50 pounds left, having used 50½ pounds in the return trip. The engine was under as perfect control as the ordinary dummy.

Refrigerating Passenger-Cars.

IN anticipation of a hot summer to compensate for the present unusually severe winter, we give the following description, contained in a Calcutta paper, of a method of cooling cars adopted in India in the case of two coaches used by the viceroy and his staff:

"Under the floor of the car there is an air-chamber, with ventilators at each end for collecting the air in the direction in which the train proceeds. Above these air-chambers there are four layers of khuskhus mats, with spaces for the air left between them, through which a current passes into the interior of the car. The 'tatties' are watered by means of a peculiarly-constructed bucket, which is replenished by a small pipe from a tank, which, when once filled, will not be exhausted before six hours. The bucket is so adjusted as to tilt over at intervals of a quarter of an hour, and to discharge its contents into two pipes that run through the centre of the car floor. These pipes have long slits cut in them, through which the water is dispersed over shallow perforated tin trays placed over the khuskhus mats, upon which the water falls in the form of rain. Perfect ventilation, which has hitherto always been the stumbling-block in similar enterprises, is effected in this case by the windows, which open outward, and are secured at a lateral angle of about 30°. The outer heated air, coming in contact with the window, strikes off from it, and, without raising an actual draught, creates a current which draws out the cool air inside the car by the windows. These windows are so constructed that every alternate window opens in one direction, so that while one set of windows is opened while a train proceeds in one direction, the other set may be used while the train proceeds the other way. In addition to the above arrangements there is a self-acting ventilator in the roof, which is nothing more than a shutter working on a central pivot, which is kept open in the direction in which the train moves. These windows and ventilators entirely exclude the entrance of the external air, and no air is admitted into the interior of the car which does not first pass through the cool air-spaces in the flooring, which, being necessarily free from dust, insures comfort and cleanliness in the interior."

An Iron Transfer-Table.

THE transfer-table of the new shops of the Wason Manufacturing Company, at Springfield, presents some peculiarities of construction not often found in similar appliances. It is 50 feet long, made entirely of iron, and weighs about 12 tons, including a double-acting rotary engine and propelling machinery attached to it. The track is 1250 feet in length, and has three rails. The engine is about 12 horse-power, and has an upright boiler. It rides on two truck-wheels bearing upon the centre rail, the power being applied to a chain pocket-gear, the chain reaching the length of the track and fast at each end. By means of a simple valve, the steam is changed from one set of cams to the other, the cams of each compartment working opposite. By this arrangement the table is easily managed, and can be run either way and stopped at any desired point. Without a load, it can be run with 15 pounds of steam, and with 30 pounds the largest car can be transported the length of the track. In case of fire in the paint or erection-shops, the cars could be removed, if necessary, to the delivery track, connecting with the Connecticut River Railroad, as rapidly as they could be rolled from the buildings, and in a very short space of time. The table was designed and constructed by Mr. W. H. Paige, the superintendent of the works, and its successful working adds to his already established reputation as a skillful mechanic.

Another Rolling-Stock Company.

"THE Allegheny Car and Transportation Company" is the title of a corporation which has been organized in Pittsburg, under a charter which authorizes them to build, equip, rent, or contract for cars or other railroad vehicles, and to sell, use, or rent the same to any person or corporation, or to transport freight. Thus the company possesses the franchises of a car-manufacturing company, a rolling-stock company, with privilege to rent its cars to railroad or transportation companies and individuals, and a transportation company or freight line. The capital stock is $100,000, which may be increased to $500,000. About $80,000 have been already subscribed, and three acres of ground have been purchased in Wilkinsburg as a site for the car-works. The erection of buildings will be commenced when the season opens, and the entire establishment completed at an early day. The men who are at the head of the enterprise are some of our most substantial citizens, and have the skill requisite to make the business remunerative.—*American Manufacturer.*

The National Car-Builder,

PUBLISHED MONTHLY,

BY

VOSE, DINSMORE & CO.,

32 Warren Street, New-York; 52 Fifth Avenue, Chicago; 720 North Second Street, St. Louis.

JAMES GILLET, EDITOR.

Terms, One Dollar per Annum.

MARCH, 1873.

Editorial Announcements.

Correspondence.—*We cordially invite the coöperation of the railroad public in affording us the material for a good mechanical paper. Articles relating to rolling-stock and machinery, by those practically acquainted with those subjects, will be gratefully received. All communications must be addressed to Vose, Dinsmore & Co., No. 32 Warren Street.*

The name and address of the writer must accompany all communications designed for publication.

Advertising Rates.—*For one square, or one fifth of a column, $5 per month, or $50 a year. For half a square, $3 per month, or $25 a year. Larger advertisements by special contract.*

All communications in regard to advertising should be addressed to L. F. Dinsmore, *Post-Office Box* 4055, *New-York City, who is our agent for advertising, and authorized to make contracts, collections, etc.*

Engravings and Illustrations.

We would invite the attention of Master Car-Builders and others to the advantages to be derived from publishing in The National Car-Builder *engravings designed to illustrate the various features and details of car construction, and especially such improvements as can not otherwise be clearly presented. We will procure cuts to be made in the best manner from drawings or models that may be sent us, and charge only for the cost of engraving, inserting the same in our paper with suitable descriptive details, without charge.*

Removal.

The office of Vose, Dinsmore & Co.—including that of The National Car-Builder—has been removed from No. 1 Barclay street to the spacious store and wareroom, No. 32 Warren, corner of Church street. This change has been rendered necessary for the better accommodation of their business, which has recently been extended by the addition of a general railway supply department. The new location is a central one, easily accessible, being only one block west of Broadway, and about three blocks from the old stand. It is also better adapted in all respects to the requirements of the business, the dimensions of the building affording greatly increased room for office conveniences and the storage of stock. Special attention will hereafter be given to the department of supplies, which is now fully organized, and will be kept replenished by direct foreign importations of the most desirable and carefully selected car-trimming stock, and also with the most approved articles of domestic manufacture included in this particular line. This, in connection with the department of French steel, and their long established manufactory of railway car-springs, will enable the concern to supply their customers with almost every thing in the line of supplies and railway construction, from a conductor's badge to a steel rail. Having for many years been identified with railway interests in the manufacture and sale of springs, and having branch offices at St. Louis and Chicago, they have acquired that practical familiarity with the wants of railway operators in all parts of the country, indispensable in their line of business. With grateful acknowledgment of the liberal patronage with which they have hitherto been favored, they beg to assure their many friends, that with the superior facilities afforded by their new location, and the advantages derived from experience, no exertions will be spared in the prompt and satisfactory execution of orders.

Smith's Vacuum Brake.

In the operation of railroads there is no appliance so essential to the safety of life and property as a perfectly reliable and effective brake. In the absence of something better, the ordinary hand-brake serves its purpose very well; but it falls far short of what is actually needed to meet all the required conditions. It is, at the best, but a kind of provisional arrangement, sooner or later to be superseded by other devices, in the application of which the more powerful agencies of steam and atmospheric pressure will be employed instead of muscular force. Nearly all intelligent railway mechanics concur in the opinion that a perfect brake should be entirely under the control of the engineer, and do the work required of it, at all times and in every emergency, with hardly a possibility of failure. It should also be comparatively simple in its construction, with small liability to get out of order, easily repaired, and of moderate cost. The Westinghouse air-brake is a great improvement upon previous devices, and is deservedly popular; but owing to its complicated mechanism and the constant attention required to keep it in good working order, it has failed to receive the unqualified approval of many practical railway mechanics and engineers, who believe that other and better methods are attainable, if, indeed, they have not already been discovered and applied.

The correctness of this opinion appears to be verified by the practical working of an apparatus invented by Mr. J. Y. Smith, of Pittsburg, and called the "vacuum brake." This device seems to be working its way into favor by its intrinsic merits, and, in the opinion of some of the best railroad managers, it is in many important points a manifest improvement on the Westinghouse plan. Its superiority has already been established by the most satisfactory of all tests, and that is its *use* for nearly a year, and subsequent adoption on some of the best-managed roads in the country. The apparatus consists of an air-ejector placed in the cab of the locomotive, and connected by pipes and hose with a flexible air-chamber under each car between the trucks. This chamber is in the form of a cylinder which is contracted or expanded as the air is exhausted or admitted. By the application of steam to the ejector, a vacuum is instantaneously produced in the flexible chamber, and the brake-rods being attached to the iron heads or ends of the chamber, these latter, when drawn together by the external atmospheric pressure, act directly upon the brakes. The power can be applied gradually or otherwise, as circumstances may require, and the pressure of the brakes, when set, is instantly relieved by opening an air-valve. The entire apparatus is under the control of the engineer, its action is positive and sure, and in practice has never failed to perform all that is required.

The superiority of the vacuum principle consists in the fact that the pressure is applied externally, which tends to keep the coupling-joints of the hose tight by drawing them together. It is also applied to the rear car first, which obviates the breaking of couplings, as well as the unpleasant motion caused by the usual method of applying brakes. It is far less complicated than any other pressure-brake we have seen, can be manufactured cheaper, and is more readily applied. It has no air-pumps to get out of order, no iron cylinder with pistons under the cars, no cumbersome air-reservoirs about the locomotive, and does not require the continual attention of the engineer. It can bring a train to a standstill gradually, if required, or quicker, if necessary, than any other brake in existence. Its capacity in this respect, as compared with that of the Westinghouse, was recently tested on the Reading Railroad. The brakes were applied to two trains of equal length, running a distance of four miles at a speed of thirty-five miles an hour on parallel tracks between Reading and Leesport. The brakes were applied at a given signal, and on the first trial, the train to which the vacuum-brake was attached was stopped at a distance of seventy feet less than the other train, and on the second trial, at a distance of a hundred feet less.

This brake is in use on the Boston and Lowell, New-York, New-Haven, and Hartford, and the Central Railroad of New-Jersey. From our own personal observation of its working for several months past on the last-named road, we are satisfied that nothing but a fair trial is necessary to insure its general adoption.

In our next number we hope to be able to give a more particular description of it, accompanied with suitable illustrations.

Boiler Explosions.

About a month ago, three terrific boiler explosions occurred in a single day—one at Pittsburg, one at Syracuse, and another at Conshohocken—involving in the aggregate a fearful destruction of life and property. Others of the same character will doubtless occur in the future as they have done in the past, and the important inquiry is suggested as to whether a correct diagnosis of these phenomena is beyond the reach of scientific discovery. That kind of elucidation which assigns no other reason for such occurrences than the inability of the boiler to sustain the pressure within, is very satisfactory as far as it goes, but it is not likely to lead to any practical means of prevention. The mystery still remains, and can not be cleared up by evasion. The many investigations and inquests which have heretofore been made, very clearly demonstrate that such accidents often occur when there is no inferiority of metal or apparent fault in construction, and where every supposed requirement of safety has been provided; yet a hidden force exists either in the form of a gradually augmenting pressure analogous to the expansion of heated air in a bladder, or in the nature of a subtle explosive element generated in some mysterious way, the one bursting the boiler by over-pressure merely, the other rending it with an explosive force resembling that of gunpowder or nitro-glycerine. That this unknown explosive agency is something essentially different from the mere expansive power of steam, and is subject to other laws than those which govern the evaporation of water, seems more than probable. The problem to be solved is to determine what this agency is, and the conditions of its development. The experiments that have been made with the view of settling these points have not as yet been sufficiently thorough to yield any satisfactory results; but it seems to us that if they could be made on a larger scale, and under the supervision of accomplished scientific experts, our present knowledge on the subject would be materially increased. As such an undertaking would involve a liberal expenditure, it might very properly be organized and conducted under the auspices of the federal government. The experiments should be sufficiently numerous and prolonged to test all the conditions incident to the practical use of steam boilers, embracing material, construction, management, water-supply, fuel, and whatever will tend to throw additional light on the causes of explosions, and lead to the adoption of more effective means for their prevention. It is quite evident that the usual precautions, such as good iron, safety-valves, steam and water-gauges, and careful attention, are not at all times and in every case proof against the occurrence of accident. Steam is the universal motor, the muscle and main-spring of modern civilization, not likely to be superseded very soon by any other agency, and the sooner all its mysteries are penetrated, the sooner will it be divested of the terrors depicted in last month's record of its doings.

Car-Builders' Monthly Meeting.

THE regular monthly meeting of master car-builders was held at the rooms of the association, 111 Liberty street, on Thursday evening, February 20th. The attendance was much larger than at the last previous meeting, and indicated an increasing interest in the objects designed to be promoted in the opening of the rooms. After some general conversation and the interchange of social greetings, the meeting was called to order by Mr. Garey, chairman of the committee on models and drawings, when, at the request of the chairman, Mr. Miltimore, of Chicago, exhibited a model of the Doty and Miltimore compound axle, with independent wheels, and explained at considerable length its peculiarities of construction and operation. Its merits and advantages, as compared with the rigid axle and wheel, were set forth with much minuteness of detail. Numerous questions were elicited from the attentive and scrutinizing audience, which were very readily if not satisfactorily answered; the proposed innovation being such a radical one, and so complicated in its mechanism that any decision as to its practicability, based upon its apparent merits as exhibited in a model, would necessarily be premature.

The attention of the meeting was next invited to a new process of graining, which was exhibited by Mr. Cross, of the firm of Cross & Bastine, of this city, and which is evidently a great improvement upon the ordinary method of hand-graining as regards saving of labor and the effect produced. By this process—which is a very simple one, and can be performed in two or three minutes—an impression is taken from the natural grain of any smooth surface of wood, and transferred to the surface to be grained with such perfect fidelity as to produce an exact imitation of the natural grain, and requiring the closest inspection to discern the difference.

A model of a newly-invented friction-clutch for shafting was exhibited at a previous meeting, and elicited marked approval as an ingenious and effective device. The inventor now presented a car-truck model equipped with the same device applied as a wheel-brake. No satisfactory test has yet been made of it, but the principle embodied is one which may yet be applied to very great advantage as a brake. There is no lack of power, if it can be utilized and simplified in its application.

After the transaction of some other business of minor importance, and the inspection of sundry drawings illustrative of mechanical devices pertaining to car-construction, the meeting adjourned.

Railway Nomenclature.

IT is to be hoped that when the time arrives for the next annual meeting of the Master Car-builders' Association, the committee in charge of the subject will be prepared to report some gratifying progress in the preparation of the much-needed "Dictionary of Terms," so that by the end of the year, the work will be completed and ready for delivery. As its preparation necessarily involves a great deal of time and labor to make it what it should be, the actual cost of a single copy will very likely be somewhat out of proportion to its bulk. The volume will be strictly a *multum in parvo* affair, quite different as respects contents and size from "Webster's Unabridged," but far more useful as a technical manual to every one connected with the mechanical departments of railways. It is extremely desirable that the utmost care and discrimination should be exercised in preparing the first edition, so that it will meet with ready acceptance, and be recognized as a standard authority at the outset. The whole field of railway nomenclature can not, in the nature of the case, be covered or provided for at once. The growth of the railway system, and its multifarious and complicated details, will necessarily be productive of new methods and devices requiring new names to designate them. These can be considered as they come up, and the names added to each subsequent edition of the work. It will be a vocabulary which, if once well started, will receive constant additions, and become more and more intrinsically valuable.

It is unnecessary to dwell upon the confusion, perplexity, misunderstanding, loss of time, and occasional profanity, resulting from the use of ambiguous, arbitrary, and inappropriate terms to designate this, that, and the other thing in railway operation, when, as it very often happens, one is practically in a hurry. Mechanical terms should have exact and definite meanings, liable to no misapprehension, especially among mechanics; and the effort now being made to elaborate something like a system to supply a deficiency long felt, is a step in the progress of railway literature which promises good results. Let it be well done, and speedily if possible; but at all events, well done.

A Card.

MESSRS. Vose, Dinsmore & Co. will be happy to extend a social greeting to their friends, at their new offices, No. 32 Warren, corner of Church street, on Thursday, March 20th, between the hours of 3 and 6 o'clock P.M.

AMONG the miscellaneous items of our last issue was a paragraph taken from an exchange, containing an erroneous statement as regards the name and capacity of a small locomotive engine manufactured by Dawson & Baily, of Connellsville, Pa. The name of the engine is *Aristide* and not Aristotle, its weight four tons, gauge 24 inches; it is working on a grade of 150 feet to the mile, and hauls 25 tons. The six-wheel connected freight-engines built by this firm for the Ripley narrow-gauge road, haul 100 tons, the grade of some parts of the road being 130 feet to the mile. In fair weather they make 18 or 20 miles per hour.

THE graphic poetical description of "Johnny Bartholomew's Dash," published in our last issue, should have been credited to *Crofutt's Western World*, in which it originally appeared. The *World* is a thoroughly live paper, published monthly, and specially devoted to railroad and kindred interests of the Great West. Each number contains sixteen four-column pages filled with a large quantity of original matter, and one or more illustrations of Western scenery of peculiar interest to tourists and settlers. Price $1.50 a year, including a 12 x 16 inch chromo, entitled "American Progress," and printed in 19 colors. Published by George A. Crofutt, 138 Nassau street, New-York.

WE are indebted to Mr. J. H. Setchel, Secretary of the Railway Master Mechanics' Association, for a copy of the proceedings of their fifth annual convention.

Device for Washing Cars.

THE Earl of Caithness, a director of an English railway, has devised and patented a contrivance for washing cars. The device consists of an upright tube as high as the cars; the tube is perforated to permit the ejection of water through it, upon and through large brushes. These brushes, being fastened to the tube, revolve with it. A contrivance of this kind is erected on both sides of a track, and the washing process is done by drawing the cars between the brushes when a switch-engine is making up a train. At our large city depots, where passenger-cars remain in station but a short time, and a great number are continually arriving and departing, and the men employed to wash cars have but fifteen minutes or less to perform their work, an arrangement of the kind described would no doubt be of practical value. It is found to be very serviceable on English railways, and is used quite extensively in London. Parties desirous to promote its use in this country should communicate with the Earl of Caithness, who is the owner of the patent-right. Letters relating to the subject should be addressed to Box 2278, Post-office, New-York.

Miscellaneous Items.

THE Danforth Locomotive and Machine Works at Paterson, N. J., are building a number of locomotives for the Baltimore and Ohio Railroad, to be used for the heaviest kind of freighting. These engines are the largest ever made in Paterson, and will weigh about 45 tons, have cylinders 20 x 24 inches, a fire-box 10 feet long, and four pairs of driving-wheels. These works are also building a number of narrow gauge engines for iron-ore railroads in Pennsylvania and New-York. Nine engines per month is the capacity of these works.

A PHILADELPHIA manufacturer is preparing a plan for a magnificent column, a thousand feet high, to be constructed entirely of iron, in open work, from the summit of which the vast area of Fairmount Park, and especially the immediate grounds of the Centennial Exposition, are to be illuminated by means of a Drummond light. If the project succeeds, this will be the loftiest monument in the world.

A BILL has been introduced into the Legislature of Missouri creating a board of railroad commissioners, giving them full power and making it their duty to see that all railroads, railroad-bridges, etc., are secure; that telegraph lines are kept up along railroad lines, and, in short, instituting a general police supervision over railroad negligence and mismanagement.

DURING the year 1872 the car-works of Seath & Hager, at Terre Haute, Ind., made and sold 850 cars, receiving therefor $600,000. They paid to employees $89,000, consumed 3590 tons of cast-iron and 1000 tons of wrought-iron. With their largely increased facilities, this enterprising firm will greatly expand their business during 1873.

A RAIL-MILL is being constructed in Louisville, at a cost of half a million dollars, for the manufacture of rails by a new system which does away with manual labor. Before the iron comes out a perfect rail, it is passed through thirteen sets of rolls, and is turned over five times for side-rolling.

THE old and widely-known "Hinkley & Williams Locomotive-Works" has had its corporate name changed, by act of the Massachusetts Legislature, to "The Hinkley Locomotive-Works," by which it will be known hereafter, and, doubtless, favorably known, as it was under the old name.

THE car-department of the new machine-shops of the St. Louis, Kansas City, and Northern Railway, at Moberly, are capable of completing three freight-cars daily, and the company expect to build their own passenger-cars, equal to the best.

THE recently burned buildings of the Adrian Car Company, at Adrian, Mich., have all been rebuilt, with the exception of the paint-shop, and the company has nearly its full force of men at work again.

A NEW company, called the Iowa Car Company, has been formed in Burlington, Iowa, which intends to put up large shops for the manufacture of freight-cars, in Burlington, early in the spring.

THE Pacific machine-shops at Sedalia are to be on a large scale. It is said that the round-house will cover four fifths of an acre, and the machine-shops four or five acres.

MR. W. L. WALLACE has been appointed master mechanic of the Buffalo division of the Lake Shore and Michigan Southern Railway shops at Buffalo.

ANOTHER snow-plow for railways has been invented, and was patented recently, by J. T. Munson, of Massachusetts. It is described as follows: One or more rotary cutters, having slicing knives arranged longitudinally with the shaft, and radial knives at right angles to the same, revolve within a frame, its forward end having projecting wings, and its rear part supporting an endless apron. The cutters and endless apron are so combined as to be operated by power applied to the central shaft.

THE Toledo, Wabash, and Western Railway Company are constructing new mail-cars of the latest pattern, 54 feet long, 9 feet 3 inches wide, and to be finished in the best style. In the interior many improvements that experience has proved valuable will be adopted. Prominent among these are bottomless boxes with sacks attached, in place of the old-fashioned method of distributing mail. The cars will probably be placed on the road in April.

THE Crane Iron Company at Catasauqua, Pa., are constructing a new pattern of cinder-cars, which will be capable of hauling nearly twice the quantity those now in use do, and it is said they will be far superior to any in the Lehigh Valley.

EIGHT new-coal cars are turned out of the car-shops daily at Packerton, Pa. Over eighteen hundred new cars were made there last year, besides repairing and fixing up old and injured ones.

MR. J. C. JONES, who has been for eight years foreman of the shops of the Atlantic and Great Western Railway at Kent, has purchased an interest in the machine-shop of Stockwell, Griffin & Co., Ravenna, and taken charge of the shop.

MR. FRANK E. CLAPPERT, for nineteen years in the service of the Illinois Central Railroad Company, much of the time as foreman of the engine-house at the Weldon shops in Chicago, has accepted a similar position on the Houston and Texas Central Railroad. As a token of their esteem, his fellow-employees presented him with a purse, as a testimonial on parting with him.

THE Chicago, Danville, and Vincennes Railroad Company have ordered the construction of 600 freight-cars and 10 locomotives. The business of the road has largely increased and requires an equipment to meet the demand. The machine-shops at Danville are finished and occupied, and a new freight-house 250 × 80, will immediately be commenced. A new passenger depot will be commenced next summer.

MR. S. M. CUMMINGS, master mechanic of the Pittsburg, Fort Wayne, and Chicago Railroad at Allegheny, Pa., was severely injured, not long since, by falling into an engine-pit, breaking his leg and receiving sundry bruises. He is now recovering.

MR. CHARLES GRAHAM, master mechanic of the Lackawanna and Bloomsburg Railroad, has entirely recovered from the effect of the pistol-shot wound received by him in November last.

TOO much wheat, it seems, was raised in California last summer. There are not enough storehouses there to hold the crop, or ships enough coming to San Francisco to carry away the surplus. Many thousands of bushels remain unthrashed in the fields, and although freights are double the rates of the previous year, a hundred ships at least could be filled up with the wheat now stored in San Francisco. Truly the Golden Horn is a horn of plenty.

THE name of the Western and Southern Railroad Association has been changed to "Railway Association of America." Its next meeting will be in May, at the St. Nicholas Hotel, in New-York. The following circular to officers of railroad companies has been issued by Mr. Harry E. Sharpe, the Corresponding Secretary of the Association:

"In order to preserve the materials for a future history of the development and economical results of the railroads of the United States, this association has resolved to form a central depository, in which all such materials can be carefully sorted, compiled, and kept. The secretary has been instructed to place himself in communication with all railroads, and with such other persons as are likely to have reports, pamphlets, etc., which they may desire to see preserved. I have therefore to request the favor of your sending to my address copies of past reports, as many as you have on hand, and a copy of all future reports of your road, reports of experiments, and any other papers you may consider of general interest to the profession."

New Publications.

The Manufacturer and Builder for February contains a great variety of articles, interesting and instructive to the general reader, and of special value to mechanics, artisans, and builders. Besides numerous illustrations of machinery and mechanical devices, it contains a full-page engraving of the central rotunda of the Vienna exhibition building. As a medium of information upon scientific topics, inventions, industrial pursuits, and every branch of material progress and development, it ranks among the best publications of its class. Each number contains twenty-four pages, exclusive of advertisements. Price $2 a year, including a 10 x 12 inch chromo. Published by the Engineers and Manufacturers' Publishing Company, 37 Park Row, New-York.

The Penn Monthly for February contains an elaborate and well-written article on the tax system of Pennsylvania, characterizing it as a jumble of conflicting judicial decisions, cumbrous, costly, and wasteful, based upon no principle, and in many cases the result of legislative prejudice and ignorance. The writer urges the necessity of a thorough revision, in order to protect and develop the industrial energies and resources of the commonwealth. The other articles treat of topics specially interesting to thoughtful and intelligent readers. The leading purpose of the magazine is the discussion of educational, social, political, and financial questions, from a high and discriminating stand-point, and in this its character is ably sustained by the best writers. Price, $2.50 a year. Published at 506 Walnut street, Philadelphia.

THE Chicago *Railway Review* has recently been changed to a twenty-page paper, each page containing four columns. This is a decided improvement on its previous quarto form. It is also beautifully printed on tinted paper, and presents a very attractive appearance, which is in keeping with the quality of its contents as a reliable railroad journal. Mr. W. F. Goodhue, a gentleman of large experience as a civil engineer, and practically familiar with the progress of railroads in the West and Southwest, has recently been associated with Mr. D. C. Brooks in the capacity of managing editor, and will prove a valuable acquisition to the paper.

The Hub for February sustains its reputation as the accredited organ of the coach and carriage-making trade, and is unsurpassed in beautiful typography and the elegance and variety of its illustrations. The editor, Mr. George W. W. Houghton, is in Europe for the purpose of attending the Vienna Exhibition.

Facetiæ.

A YOUNG lady of St. Louis has just sent to Europe an order for fifty yards of Brussels carpet, twenty-five feet wide. She is going to work a pair of slippers for the editor of a local paper.

THE Cleveland *Leader* thinks it has enough poetry on hand to last until next fall; but if the spring is backward, and the fires have to be kept up, it will probably need more.

A STONE which marks a little grave in the midst of a Western prairie, bears the single word "Polecat-scentedem." A man had buried his clothes there.

SOME idea of the contents of a freight-train may be gained by keeping your foot on the track until it has passed.

"FELLOW-TRABLERS," said a colored preacher, "ef I had been eatin' dried apples for a week, an' den took to drinkin' for a monf, I couldn't feel more swell'd up dan I am dis minnit wid pride an' wanity at seein' such full 'tendence har dis evenin' "

WHO was the straightest man in the Bible? Joseph; for Pharaoh wanted to make a ruler of him.

A DANDY on shore is bad enough, but a swell on the sea is sickening.

"WHY do we celebrate the 22d of February?" asked a school trustee of a pupil he was catechising.

"Because it is Washington's birthday," was the response.

"Why," asked the trustee, "should we celebrate his birthday more than mine?"

There was no answer. The trustee looked from one to the other with a sort of half-surprise, half-reproach, till finally a little, dirty-faced, tangle-haired urchin at the very foot held up his hand to attract attention.

"I know, sir," said the boy.

"Ah!" said the trustee, with an air of relief and satisfaction; "why is it, my little man?"

"'Cause *he* never told a lie!"

THE effeminate man is a weak poultice. He is a cross between root-beer and gingerpop, with the cork left out. He is a teacup full of syllabub; a kitten in pantalettes; a sick monkey with a blonde moustache; a paper kite in a dead calm. He lives like a butterfly—nobody can tell why. He is as harmless as a cent's worth of spruce gum, and as useless as a shirt-button without a hole. He is as lazy as a bread pill, has no more hope than a last year's grasshopper, and dies like cologne-water spilt on the ground.

AT CHICAGO recently, a lady at church was seen to bow her head as if in pious thought. She suddenly raised it and leaned back against the seat, when an explosion occurred that shook the building. She had pressed too heavily on an air-cushion bustle.

IN some epizooized cities the milkmen use oxen instead of horses for distribution of their supplies. It would be as easy to bring the cows themselves to their customer's doors; but the pump—ay, there's the rub!

A WESTERN editor was recently requested to send his paper to a distant patron, provided he would take his pay in "trade." At the end of the year he found that his subscriber was a coffin-maker.

IT was Daniel who said, "Many shall run to and fro, and knowledge shall be increased." He clearly referred to reporters in this remark, and this suggests the idea that Daniel was in that line himself; it is certain at all events that he was allowed to pass in free to see the lions.

A COMPASSIONATE Boston lady seeing a vegetable vender beating his horse cruelly, cried out, "Have you no mercy?" to which the astonished man replied, "No, mem; I've nothing left but greens and cucumbers."

A CERTAIN little damsel having been aggravated beyond endurance by her brother, plumped down upon her knees and cried, "O Lord! bless my brother Tom. He lies, he steals, he swears; all boys do; us girls don't. Amen."

A DANBURY sport wears a ten-cent silver piece on his shirt bosom, and calls it a dime and pin; which it certainly is.

A VIRGINIA paper describes a fence which is made of such crooked rails that every time a pig crawls through he comes out on the same side.

AN eccentric but benevolent Danbury man hearing that several thousand working girls lost all by the Boston fire, generously shipped them sixteen volumes of Patent Office reports.

A WESTERN young men's society has ascertained that what they paid Anna Dickinson for one lecture would buy three thousand glasses of beer.

A PEORIA man staid out in the yard until two o'clock the other night, trying to freeze his dog to death. Five doctors' buggies were standing in front of his house the next morning, and the dog is sucking eggs by day and howling by night, as usual.

Publishers' Notices.

WHARTON'S RAILROAD SWITCH.—We have already given a description of this valuable invention in our January number, and we again allude to it on account of its great practical importance as shown by its satisfactory working on many leading lines of road. It is difficult to give a clear and correct idea of its operation by any merely written description, unless accompanied by a complete drawing; and even in such case the switch itself in practical use would be a still better illustration of its merits. There is no question, however, as to its utility, economy, and safety. It is a radical innovation upon the ordinary switch, and effectually does away with its objectionable features. The main track, under the operation of the new invention, is left unbroken and continuous. The switch-rails with the movable guard are so arranged that when the switch is not in use, they do not in any way act upon or touch against the car-wheels moving on the main track; while, when it is desired to transfer cars from the main track to the siding, they are so moved that the transfer is accomplished in an easy and gentle manner, the switch apparatus being released immediately thereafter, resulting in the switch-rails being again moved from the main track, leaving it entirely clear for all succeeding wheels. Or, in other words, if you don't want to use it, you have not got any switch to all intents and purposes; and when you don't use it, it is not wearing out. The estimated cost of one of these switches for a period of five years is $141.50, while the cost of the ordinary kind for the same time is $405.50, not including the saving of labor in surfacing up, and the diminished wear and tear of rolling stock on a continuous track. We refer the reader to advertisement on page 52.

CAR, COACH, AND OTHER VARNISHES.—The attention of car-builders and railway supply agents is invited to the advertisement on page 69, of Mr. J. J. Reid, 354 Mulberry street, Newark, N. J., manufacturer of articles in this line. Mr. Reid established his business in 1849, and being a practical coach, and subsequently car-painter, entered upon the manufacture of car and coach varnishes with a full knowledge of what painters mean when they make their distinctions, so incomprehensible to others, between varnishes as regards their qualities of freedom under the brush, fullness, and rubbing; while his *wearing varnishes* possess a lightness of color, lustre, and durability surpassed by none of foreign or domestic manufacture.

LANSDELL'S PATENT PORTABLE RAILWAY SYPHON.—Every improvement which lessens the expenditure by adding to the facilities of operating railroads, is a gain to the corporations owning them, as well as an advantage to the general public. Such an improvement is the invention above named, by means of which the water-tank of a locomotive tender can be replenished from a well or reservoir below the level of the track. The apparatus is made entirely of iron, is simple in its construction, of portable dimensions, and not liable to get out of order. It may be placed over a well or other source of water-supply near the track, and by connecting a steam-pipe or hose from the locomotive with a similar one attached to the syphon, the water is forced up by the combined action of steam and atmospheric pressure, and discharged into the tender at the rate of a thousand gallons a minute, the temperature of the water being raised in the mean time to about 80° by the condensed steam. As soon as the tender is filled and the steam shut off, the water instantly runs out of the syphon pipe back into the reservoir, so that no trouble occurs from freezing. The cost of the apparatus does not exceed that of a well-constructed ordinary water-tank, while it requires no attendance other than that of the engineer in charge of the locomotive, so that the expense of erecting and running it the first year is not more than one-third of that of the common water station, and the saving the second year will nearly equal its original cost. It may be carried on construction trains for the convenience of taking water from any accessible source. It has been approved and adopted by the United States board of supervisors for use on steamboats, where it is now doing good service. The agents for its sale are Leng and Ogden, 4 Fletcher street, New-York. See advertisement on page 49.

Jersey City Steel Works.

JAMES R. THOMPSON & CO.,

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HAMMERED AND ROLLED

CAST STEEL,

OF ALL DESCRIPTIONS,

Warren Street, Jersey City, N. J.

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Narrow Gauge Locomotives a Specialty.

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Manufacture all kinds of Machinists' and Car-Builders' Tools, for working Iron, such as Lathes, Planers, Sloting Machines, Horizontal Drilling and Boring Machines, Vertical Drills, all sizes, Shaping Machines, Bolt Cutters, Nut Tappers, Car Wheel Borers, Hydraulic Wheel Press, Axle Lathes, etc. Patent Sectional Tubular Boiler, safety and great economy at moderate cost.

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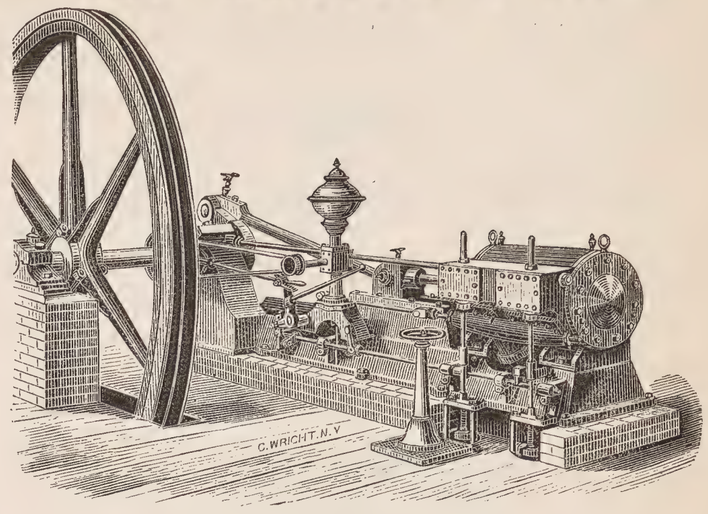

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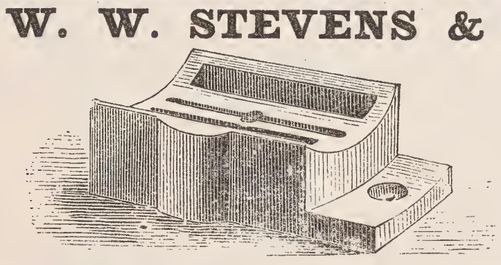

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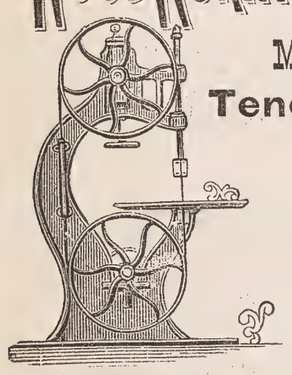

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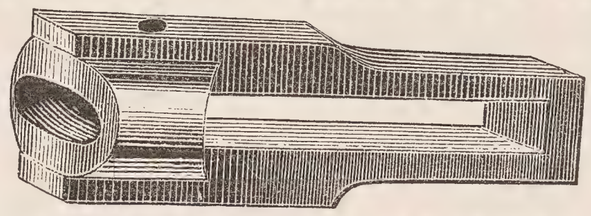

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Billmeyer & Smalls..... .....York, Pa.
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Bridgeport Car Works .....Bridgeport, Pa.
Brill, J. G. & Co..... .....Philadelphia, Pa.
Bitner, George W..... Pittsburg, Pa.
Buffalo Car Co..... .....Buffalo, N. Y.
Canada Car Co ..... Toronto, Canada.
Canda, F. E & Co..... Chicago, Ill.
Canada Steam-Engine Co..... ... Kingston, Canada.
Cartersville Car Co .....Cartersville, Ga.
Central Car & Manufacturing Co .....Jackson, Mich.
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Cummings Car-Works.....Jersey City, N. J.
Connellsville Machine and Car Co.....Connellsville, Pa.
Corunna Car Co... ....Corunna, Mich.
De Pere Iron Works.....De Pere, Wis.
Detroit Car Works ....Detroit, Mich.
Detroit Car and Manufacturing Co .....Detroit, Mich.
Dawson Manufacturing Co.....Dawson, Ga.
Dickey, Neill & Co.... .....Toronto.
Dickson Manufacturing Co.....Scranton, Pa.
Erie Car-Works.....Erie, Pa.
Elmira Car-Works.....Elmira, N. Y.
Fredericks & Co ... .Catasauqua, Pa.
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Fremont Car Co .....Fremont, Ohio.
Gardner, F. & Co. ....Carlisle, Pa.
Gill, John L.....Columbus, Ohio.
Gilbert, Bush & Co.....Troy, N Y.
Goold, James & Co..... Albany, N. Y.
Goodrich Car Co..... ....Augusta, Ga.
Haskell & Barker .....Michigan City, Ind.
Harrisburg Car Manufacturing Co .....Harrisburg, Pa.
Heathcote, Herbst & Co..... ...Glen Rock, Pa.
Hamilton, William & Son .....Toronto.
Harlan & Hollingsworth Co.....Wilmington, Del
Indiana Car Co... .....Cambridge City, Ind.
Indianapolis Car Co..... .....Indianapolis, Ind.
Jackson & Sharp Co .....Wilmington, Del.
Jackson & Woodin Manufacturing Co....Berwick, Pa.
Jones, J. M. & Co..... .....West-Troy, N. Y.
Kimball Manufacturing Co..... .....San Francisco, Cal.
Keith, H. T. & I. N ....W. Sandwich, Mass.
Laporte Car Manufacturing Co. .....Laporte, Ind.
Lombard, Thomas.....Augusta, Me.
Lebanon Manufacturing Co..... . Lebanon, Pa.
Lehigh Car Manufacturing Co.....Stemton, Pa.
Litchfield Car Manufacturing Co.... .. ..Litchfield, Ill.
Mansfield Car Works.....Mansfield, Ohio.
Michigan Car Co ....Detroit, Mich.
McNairy, Claflen & Co..... .. Cleveland, Ohio.
Murray, Dougall & Co.....Milton, Pa.
McVay, Walker & Co..... .....Braddock's Field, Pa.
Mowry Car and Wheel Works..... ..Cincinnati, O.
Middletown Car & Manufacturing Co.....Middletown, Pa.
Missouri Car and Foundry Co.....St. Louis, Mo.
New-Haven Car Co..... .....New-Haven, Ct.
Niblo, James M .....Conshohocken, Pa.
Ohio Falls Car Co..... ....Jeffersonville, Ind.
Ontario Car Co... ....London, Ont.
Patten Car Works.....Bath, Maine.
Peabody & Crangle Bro's ....Calais, Me.
Peters, Simon..... ....Quebec.
Pittsburg and McKeesport Car Co.....McKeesport, Pa.
Pittsburg Car and Locomotive Co .....Pittsburg, Pa.
Portland Co..... . .....Portland, Me.
Pullman Car Co ... .Chicago.
Peregoy, J. H .....Houston, Texas.
Quealy Car & Iron Works .....Hannibal, Mo.
Ranlet Car Manufacturing Co..... .Laconia, N. H.
Russell & Co .....Massillon, Ohio.
Sands, William L.....Pottstown, Pa.
Schoharie Machine Co..... ...Schoharie, N. Y.
Schall, Michael..... .....York, Pa.
Shaaber & Johnston .. ..Reading, Pa.
Southern Car-Works. .....Independence, La.
South-Western Car Co.....Jeffersonville, Ind.
Shoenberger & Bryant..... .....Duluth, Minn.
Seath & Hager..... .....Terre Haute, Ind.
Stephenson, John & Co..... ..... New-York, N. Y.
Taunton Car Co.....Taunton, Mass
Tredegar Co .....Richmond, Va.
Tiffin Car-Works.....Tiffin, Ohio.
Vigo Foundry and Terre Haute Car-WorksTerre Haute, Ind.
Wharton, Thomas J.....Brunswick, Ga.
Whittaker, Phillips & Co ....Toledo, Ohio.
Wason Manufacturing Co.....Springfield, Mass
Weimer, P. L & Bros.....Lebanon, Pa.
Wyoming Valley Manufacturing Co... ...Wilkesbarre, Pa.
Wells, French & Co..... ...Chicago, Ill.
Wilmington Car-Works.....Wilmington, Del.

Car-Wheel Manufacturers.

Albany Car-Wheel Works .....Albany, N. Y.
American Paper Car-Wheel Co..... ....Pittsford, Vt.
Atlantic Iron-Works .....Portsmouth, Va.
Baltimore Car-Wheel Foundry Co.....Baltimore, Md.
Barnum & Richardson Manufacturing Co....Chicago, Ill.
Barney & Smith Manufacturing Co. ....Dayton, Ohio.
Bass & Hanna..... .... Fort Wayne, Ind.
Bailey, Howson & Co .....St. Paul, Minn.
Blanchard & Arnold..... .....Milwaukee, Wis.
Boston Car-Wheel Co.....Camb'gep't, Mass.
Bowler, Mayer & Brayton..... ...Cleveland, Ohio.
Davenport, Fairbairn & Co..... .....Erie, Pa.
Dawson Manufacturing Co.....Dawson, Ga.
Detroit Car-Wheel Works..... .Detroit, Mich.
Fulton Foundry Co..... ...Cleveland, Ohio.
Gill & Bidwell..... .. ..Allegheny City, Pa.
Green, D. P. & Co..... ... .St. Louis, Mo.
Hamtramck Car-Wheel Works.....Detroit, Mich.
Harrisburg Car Manufacturing Co.....Harrisburg, Pa.
Heartt, Jonas S. & Co..... .....Troy, N. Y.
Jackson & Woodin.....Berwick, Pa.
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Lobdell Car-Wheel Works .....Wilmington, Del.
Louisville Car-Wheel & Railway Supply Co....Louisville, Ky.
Middlebrook & Mack..... ...Oswego, N. Y.
Missouri Car and Foundry Co.....St. Louis, Mo.
Moore Elastic Car-Wheel Co .....Jersey City, N. J.
Mowry Car and Wheel Works.....Cincinnati, Ohio.
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Rutland Foundry & Machine Co.....Rutland, Vt.
Sterling Car-Wheel Foundry..... .Columbus, Ohio.
Scoville, J. & N. C ....Buffalo, N. Y.
St. Louis Car-Wheel Co.... ....St Louis, Mo.
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Thompson, Duglas..... ..... Bordentown, N. J.
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Toronto Car-Wheel Co..... .....Toronto, Can.
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Whitney A. & Sons..... ....Philadelphia, Pa.
Woodbury & Company..... .....E Cambr'ge, Mass.
Wyoming Valley Manufacturing Co.....Wilkesbarre, Pa.

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Brooks Locomotive Works ....Dunkirk, N. Y.
Danforth & Cooke .. ..Paterson, N. J
Dawson & Baily (light locomotives).....Pittsburg, Pa
Dickson Manufacturing Co ....Scranton, Pa.
Grant Locomotive Works..... .....Paterson, N. J.
Hinckley Locomotive Wo ks..... ...Boston, Mass.
Manchester Locomotive Works.....Manchester, N. H.
Mason, William..... .....Taunton, Mass.
McKay Iron and Locomotive Works.....Jersey City, N. J.
Portland Company..... ... .Portland, Me.
Porter, Bell & Co. (light locomotives) .. ...Pittsburg, Pa.
Pittsburg Locomotive Works.....Pittsburg, Pa.
Rogers Locomotive Works ..... . .Paterson, N. J.
Rhode Island Locomotive Works ....Providence, R. I.
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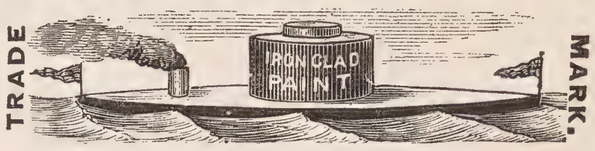

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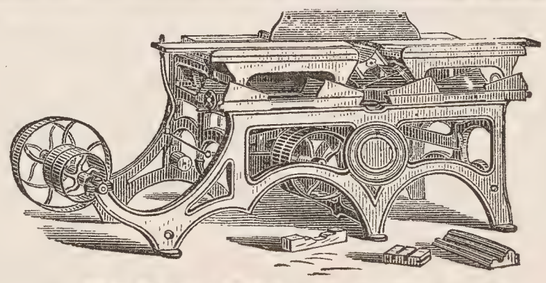

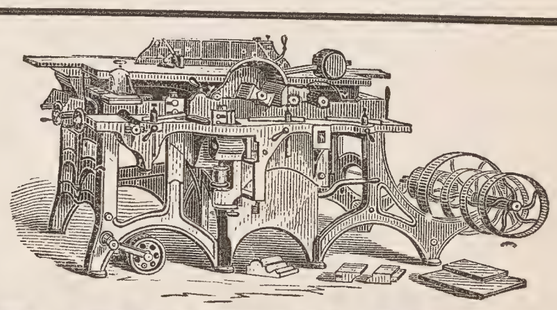

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Bangor & Piscataquis		J. W. Comins	Old Town, Maine.
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East-Tennessee & Georgia	Eli Hixon		Knoxville, Tenn.
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Erie Railway	James B. Gregg		Susquehanna, N. Y.
Erie Railway	H. L. Brown	C. A. Smith	Jersey City, N. J.
Erie Railway	J. G. Hubbard	M. Wilder	Buffalo, N. Y.
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Great Western of Canada	†Wm. A. Robinson	F. Childs	Hamilton, Canada.
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Houghton & Ontonagon			L'Anse, Mich.
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North Division	J. B. Edams		Amboy, Ill
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Iowa & Missouri State Line			Farmington, Iowa
Iron	Perry Scott	Clem. Roetling	Ironton, Ohio.
Indianapolis & St. Louis	Wm. Barkla	R. B. More	Mattoon, Ill.
Indianapolis, Bloomington & Western	Tho. V. Losee	Tho. V. Losee	Urbana, Ill.
Ionia & Lansing	H. Loughlin		Lansing, Mich.
Indianapolis & Vincennes	A. E. Allcott		Indianapolis, Ia.
Ithaca & Athens	F. A. Brown		Ithaca, N. Y.
J			
Jeffersonville, Madison & Indiana	Reuben Wells	John Higgins	Jeffersonville, Ind.
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Denver & Boulder Valley Div.	**L. H. Waugh		Wyandotte, Kansas.
Junction City & Ft. Kearney Div.	**L. H. Waugh		Wyandotte, Kansas.
Arkansas Valley Div	**L. H. Waugh.		Wyandotte, Kansas.
Kalamazoo, Allegan & Grand Rapids			Kalamazoo, Mich.
Kansas City, St. Joseph & Council Bluff.	H. L. Cooper	J. Aylesbury	St. Joseph, Mo.
L			
Lake Erie & Louisville	John Pero		Fremont, Ohio.
Lake Superior & Mississippi	W. McFarland	A Coburn	St. Paul, Minn.
Lackawanna & Bloomsburg	Chas. Graham		Kingston, Pa.
Lehigh Valley	John I. Kinley		South-Easton, Pa.
Lehigh Valley	P. Hofecker	E. R. Brown	Weatherly, Pa.
Lehigh Valley	A. Mitchell	Mauch Chunk, Pa.	Delano, Pa.
Lehigh Valley	D. Clark		Hazleton, Pa.
Leavenworth, Lawrence & Gal.	S. M. Philbrick		Lawrence, Kansas.
Little Rock & Fort Smith	A. Klohs		Little Rock, Ark.
Little Miami	J. H. Setchel.		Cincinnati, Ohio.
London & Port Stanley			London, C. W.
Louisville, New-Albany & Chicago	Jacob Losey	Jacob Losey	New-Albany, Ind.
Long Island	Chs. A. Thompson.		Hunter's Point, L. I.
Louisville, Cincinnati & Lexington	E. B. Gibbs	S. S. Pilson	Louisville, Ky.
Louisville & Nashville	†Thatcher Perkins		Louisville, Ky.
Louisville & Nashville	Jas. Montgomery		Bowling Green, Ky.
Louisville & Nashville		Isaac Owens	Louisville, Ky.
Louisville & Nashville	Tho. Welsh		Memphis, Tenn.
Louisville & Nashville	Richard Dolby		Edgefield, Tenn.
Louisville & Nashville	Wm. Russell		Decatur, Ala.
Louisville & Nashville	D. P. Rennie		Birmingham, Ala.
Nashville & Decatur Division	C. D. Knowles		Nashville, Tenn.
South & North Ala. Div.	John Skidmore		Birmingham, Ala.
Lake Shore & Michigan Southern	‡James Sedgley	††John Kirby	Cleveland, Ohio
Michigan Southern Division	William Hill		Elkhart, Ind.
" " "		S. S. Knapp.	Adrian, Mich.
Toledo Division	Geo. H. Tier	Frank O. Bray	Norwalk. Ohio.
Erie Division	L. O. Gassett	J. Withyecombe.	Cleveland Ohio.
Buffalo Division	W. L. Wallace	A. Robson	Buffalo, N. Y.
Lake Shore & Tuscarawas Valley	Charles Fellows	J. D. McIlwain	Black River, Ohio
Lake Ontario Shore	J. C. Schermerhorn	J. C. Schermerhorn	Oswego, N. Y.
M			
Marquette & Ontonagon	A. P. Burroughs	H. D. Lyons	Marquette, Mich.
Macon & Augusta			Macon, Ga.
Maine Central	J. W. Philbrick	J. W. Philbrick	Waterville, Me.
Macon & Western	D. M. Gogul	James A. Knight	Macon, Ga
Manchester & Lawrence	Chas. L. Eastman	M. W. Dickerman	Concord, N. H.

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Marietta & Cincinnati	E. Bosley	E. Bosley	Chillicothe, Ohio.
Memphis & Little Rock	N. Greener	C. W. Wooldridge	Huntsville, Ark.
Memphis & Charleston	Michael Burk	A W. Drew	Memphis, Tenn.
Memphis & Charleston	H. N. Burford	Fabien Varin	Huntsville, Ala.
Mineral Point	Robert Hay		Mineral Point, Wis.
Mississippi & Tennessee	James Eblen	James Eblen	Memphis, Tenn.
Mississippi Central	Henry Gibbon	John E. Becton	Water Valley, Miss
Maryland & Delaware	Samuel Peters		Greensboro, Md.
Mississippi, Gains. & Tus			Gainsville, Ala.
Midland Pacific			Nebraska City, Neb.
Milwaukee & St. Paul	T. S. Davis	Wm. E. Kittrege	Milwaukee, Wis.
Milwaukee & St. Paul		John Baillie	Milwaukee, Wis.
Milwaukee & St. Paul	J. Pattee	D. F. Wilson	Minneapolis, Minn.
Hastings & Dakota Division	C. C. Clements		Hastings, Minn.
Michigan Central	A. S. Sweet, Jr	J. B. Sutherland	Detroit, Mich.
Grand River Valley Division		James Potts	Jackson, Mich.
J'kson, Lans'g & Saginaw Div.	Andrew Wilson	Andrew Wilson	Jackson Mich.
Montgomery & West-Point	J. McVey	W H Daniels	Montgomery, Ala.
Montgomery & Eufaula	James McCann	I. E. Holmes	Montgomery, Ala.
Mobile & Montgomery	James McFarland	L. Barham	Montgomery, Ala
Mobile & Girard	William Eyles	A. J. Nix	Girard, Ala.
Mobile & Ohio	L. J. Fleming	John McHugh	Mobile, Ala.
	B. S. Skates	B. S. Skates	Whistler, Ala.
Missouri River, Fort Scott & Gulf	John S. McCrum		Kansas City, Mo.
Missouri River, Fort Scott & Gulf		Josiah Stahl	Wyandotte, Kan.
Missouri, Kansas & Texas	C. T. McIlvaney	J. Townsend	Sedalia, Mo.
Missouri, Iowa & Nebraska	Geo. Adams	Geo. Adams	Alexandria, Mo.
N			
Nashville & Chattanooga	John U. Eastman	J. G. Sawyer	Nashville, Tenn.
New-Bedford & Taunton	Robert Chase	Robert Chase	New-Bedford, Mass.
New-Canaan			New-Canaan, Ct.
New-Brunswick & Canada	T. Armstrong	T. Armstrong	S'nt Andrew's, N.B.
New-Haven & Northampton	Henry Fox	Henry Fox	New-Haven, Ct.
New-York & Harlem	Wm. M. Strong	Leander Garey	New-York.
New-York Central & Hudson River	‡G. B. Van Vorst		Albany, N. Y.
New-York Central & Hudson River	Henry Watkeys		Syracuse, N. Y.
New-York Central & Hudson River	Amos Gould		Rochester, N. Y.
New-York Central & Hudson River	Jas. Butman	Wm. Johnson	Buffalo, N. Y.
New-York Central & Hudson River	Wm. Buchanan	John McKenna	New-York.
New-York Central & Hudson River	John Dikeman		East-Albany, N. Y.
New-York Central & Hudson River		Joseph Jones	West-Albany, N. Y.
New-York Central & Hudson River		George Rowe	Niagara Falls, N.Y.
New-York, Boston & Montreal			E. Tarrytown, N.Y.
New-York & Oswego Midland	Wm. H. Griggs	Wm. H. Griggs	Oswego, N. Y.
New-York, Providence & Boston	Jas. H. Anderson	Jas. HAnderson	Providence, R. I.
New-York, New-Haven & Hartford	H. Kittendorf	James Danvers	New-Haven, Ct.
New-London Northern	J. W. Dow	S. W. Caulkins	New-London, Ct.
New-Jersey Midland			Godwinsville, N. J.
New-Jersey Southern	Rufus Blodgett		Manchester, N. J.
New-Haven & Derby			New-Haven, Ct.
New-Orleans, Opelousas & Gt. Western	John McCluskey	Matthew Nolan	Algiers, La.
New-Lisbon			Leetonia, Ohio.
New-Orleans & Ohio	John R. Jordan	John R. Jordan	Paducah, Ky.
New-Orleans, Jackson & Gt. Northern	John Conlon	Charles Bartine	New-Orleans, La.
New-Haven, Hartford & Springfield			Hartford, Ct.
Naugatuck	Henry Hanford	George W. Gray	Bridgeport, Ct.
Newark & Bloomfield	Luke F. Tronson		Hoboken, N. J.
Nova Scotia	W. Johnson		Bedford, N. S.
North-Carolina	Rufus D. Wade	B. G. Sergeant	Co. Shops, N. C.
New Orleans, Mobile & Texas	Josiah Bettis	W. H. Johnson	Mobile, Ala.
Northern Central	C. M. Lewis		Baltimore, Md.
Northern Central		G. W. Demarest	York, Pa.
North-Lebanon		Henry B. Oves	Lebanon, Pa.
North-Pennsylvania	Franklin Roop	Franklin Roop	Philadelphia, Pa.
North Eastern	D. W. Haines	A. M. Corrie	Florence, S. C.
Northern	James W. Lander	Albert Langmaid	Concord, N. H.
Northern of New-Jersey	T. W. Demorest		New-York.
Norwich & Worcester	Richard Colburn	G. R. Bentley	Norwich, Ct.
Northern of Canada	P. Clark.	P. Clark	Toronto, Can.
Northern Pacific	§§Geo. W. Cushing		St. Paul, Minn.
O			
Ogdensburg & Lake Champlain	William A. Short	J. R. Ames	Malone, N. Y.
Old Colony & Newport	J. K. Taylor	A Gleason	Boston. Mass.
Orange, Alexandria & Manassas	James E. Waddey	John T. Nalls	Alexandria, Va.
Oil City & Pithole	George Thompson		Pithole, Pa.
Oil Creek & Alleghany River	J. S. McElroy	Jacob Williams	Corry, Pa.
Oil Creek & Alleghany	H.J.Bookhammer.	John Monks	Oil City, Pa.
Ohio & Mississippi		M. Contant	Cochran, Ind.
East Division	A. Thompson		Cochran, Ind.
West Division	H. Elliott	E. Martin	East St. Louis, Ill.
Oregon & California	§§J. Brandt.		Portland, Oregon.
P			
Paris & Decatur	John G. Clifford		Paris, Ill.
Panama	Chas. E. Stewart	J. G. Wilson	Aspinwall, N. G.
Pacific of Missouri	§§John Hewitt	John Hewitt	St Louis, Mo.
Pennsylvania	§§G. C. Gardner		Altoona, Pa.
Pennsylvania	H. D. Garrett	I W. Van Houten.	W. Philadelphia, Pa
Pennsylvania	E. L Caum	Samuel W. Myers.	Harrisburg, Pa.
Pennsylvania	G. W. Strattan	John P. Levan	Altoona, Pa.
Pennsylvania	D. O. Shaver.	R. S. Ramsey	Pittsburg, Pa.
New-Jersey Division.	John Headden	David H. Baker	Jersey City, N.
West-Penn. Division	C. B. Street	James F. Elder	Blairsville, Pa.
Philadelphia & Erie	Martin Walls	George J. Mason.	Sunbury. Pa.
	W. L Foster	Robt M.Messimer.	Renovo, Pa.
	W. L. Holman	Wm. P. Newcomb.	Kane, Pa.
	W. T. Smith.	David Cowley	Erie, Pa.
Philadelphia, Wilmington & Baltimore	S. A. Hodgman.	S. A. Hodgman	Wilmington, Del.
Philadelphia & Reading	L. B. Paxson	Aaron Steinbach.	Reading, Pa.
Philadelphia, Germ'n & Norris'n	John Moyer	Nathan Pawling.	Philadelphia, Pa
Philadelphia & Baltimore Central	S. D. Danfield	SamuelD.Danfield.	Chester, Pa.
Pittsburgh, Cincinnati & St. Louis			
Pittsburgh & Columbus Division	E. Pierce		Dennison, Ohio.
Pittsburgh & Columbus Division		James McGee	Steubenville, Ohio.
Little Miami Division		M. P. Ford	Columbus, Ohio.
Little Miami Division	J. H. Setchel		Pendleton, Ohio.
Col., Cin. & Ind. Division	Robert Curtis	Tho. Chamberlain	Columbus, Ohio.
Col., Cin. & Ind. Division	Geo. H. Prescott	Geo. H. Prescott	Logansport, Ind.
Peoria & Rock Island	Theo. Mosher		Peoria, Ill.
Pittsburg, Fort Wayne & Chicago	S. M. Cummings	John Marquis	Alleghany, Pa.
Pittsburg, Fort Wayne & Chicago	J. M. Boon		Fort Wayne, Ind.
Pittsburg, Fort Wayne & Chicago		J. J. Kirkland	Crestline, Ohio.
Pittsburg, Washington & Baltimore	W. H. Harrison	J. M. Rutter	Connellsville, Pa.
Peoria, Pekin & Jacksonville	R. F. Hurd	R. F. Hurd	Pekin, Ill.
Peninsular	T. G. Templeton		Battle Creek, Mich.
Portland & Rochester	John G. Brady	John G. Brady	Portland, Me.
Portland & Kennebec	John Ellis	J. W. Trussel.	Augusta. Me.
Portland & Oxford Central	Geo. W. Battles	Geo. W. Battles.	Buckfield, Me.
Portland, Saco & Portsmouth	John Donnell		Portland, Me.
Port Royal	C. W. Furber	E. Hubard	Port Royal, S. C.
Port Hope, Lindsay & Beaverton	H. G. Taylor	H. G. Taylor	Port Hope, Can.
Port Huron & Lake Michigan	R. C. Stewart	R. C. Stewart	Port Huron, Mich.
Providence, Warren & Bristol	Rufus Smith	J. Brightman	Bristol, R. I.
Portsmouth, Gt. Falls & Monmouth	James Tucker	E. Fall	Union Village, N.H.
Petersburg & Weldon	R. B. Andrews	Alex. Wright	Petersburg, Va.
Providence & Worcester	Joseph Kelly	Olney L. Smith	Providence, R. I.
Poughkeepsie & Eastern	John L. Driscoll	John L. Driscoll	Poughkeepsie, N. Y.
R			
Raleigh & Gaston	J. B. Gayle	J. B. Gayle	Raleigh, N. C.
Richmond, Fredericksburg & Potomac	H. Kuhn	W. H. Trainham	Richmond, Va.
Richmond, Danville & Piedmont	John McFarland	H. Longest	Richmond, Va.
Richmond & Petersburg	John O'Brien	J. J. Martin	Richmond, Va.
Richmond & York River	C. H. Harris	J. L. Thompson	Richmond, Va.
Rome, Watertown & Ogdensburg	Wm. Jackson	H. H. Sessions	Rome, N. Y.
Reading & Columbia	B. Van Lew		Columbia, Pa.
Rome, Georgia	O. W. Harbin	O. W. Harbin	Rome, Ga.
Rochester & Genesee Valley	M. E. Brown	M. Wilder	Buffalo, N. Y.
Rockford, Rock Island & St. Louis	Joseph Elder	J. F. Nolte	Beardstown, Ill.
S			
Southern Pacific of California	J. P. Wilson	F. N. Bellisle	San Francisco, Cal.
St. Croix & Lake Superior			New-York City.
St. Croix & Penobscot	Edward Bolton	A G. Page	Milltown, Me.
St. Lawrence & Ottawa	Calvin Dame	Calvin Dame	Prescott. Canada.
St. Louis & Iron Mountain	O. A. Haines	Oscar Doolittle	Carondelet, Mo.
St. Joseph & Denver City	E. Sleppy		Elwood, Kan.
San Antonio & Mexican Gulf	W. T. Bingham		Victoria, Texas.
South Side of Long Island	Geo. H. Griggs	M. Heitzman	Williamsburg, L. I.
St. Paul & Sioux City	F. C. Butterfield		Shakopee, Minn.
St. Louis, Vandalia, T. Haute & Ind.	C. R. Peddle	H. Kirmse	Terre Haute, Ind.
South-Carolina	W. B. Smith	John Reed	Charleston, S. C.
Southern Central	Chas. G. Brown	H. Mooney	Auburn, N. Y.
Southern Minnesota	Wm. Lininger		Wells, Minn.
Southern of Canada	Albert Congdon	Albert Congdon	Fort Erie.
South-Western of Georgia	C. D. Wall		Columbus, Ga.
South-Western of Georgia	D. M.Gogul	James A. Knight.	Macon, Ga.
South Shore	Warren E. Ray		Cohasset, Mass.
Stanstead, Shefford & Chambly	W. H. Smith	M. Sessions	Waterloo, C. E.
Schuylkill & Susquehanna	John E. Wootten.	John E. Wootten.	Reading, Pa.
Seaboard & Roanoke	J. B. Pendleton	J. B. Pendleton	Portsmouth, Va.
Stonington & Providence	J. H. Anderson	J. H. Anderson	Providence, R. I.
Selma & Gulf	Wm. T. Daughtrey		Selma, Ala.
Selma, Rome & Dalton	A. G. Maynes	W W. Peirce	Selma, Ala.
Sioux City & Pacific	Charles Foster	J. R. Dow	Missouri Val., Iowa.
Spartanburg & Union	J. N. Benner	Jacob Rice	Union C. H., S. C.
Sheboygan & Fond du Lac	— Patterson		Sheboygan, Wis.
Sullivan & Erie			Tonawanda, Pa.
Syracuse & Binghamton, N. Y.	B. G. Merrill	B. G. Merrill	Syracuse, N. Y.
Syracuse Northern	W. Garrison	J. C. Smith	Syracuse, N. Y.
Sycamore & Cortland			Sycamore, Ill.
St. Louis & South-Eastern	L. B. Salisbury		Mt. Vernon, Ill.
Nashville Division	H. M. Smith		Nashville, Tenn.
St. Louis, Kansas City & Northern	John E. Calhoun	C. S. Buck	St. Louis, Mo.
T			
Taunton Branch.			Taunton, Mass.
Tioga	Peres Bonny	D. H. Stratton	Blossburg, Pa
Texas & New-Orleans	R. B. Baer		Houston, Texas.
Tennessee & Pacific	William McKeand.	William McKeand.	Nashville, Tenn.
Toledo, Wabash & Western	W. F. Ray		Fort Wayne, Ind.
Toledo, Wabash & Western		David Hoit	Toledo. Ohio.
	T. G. Gorman		Springfield, Ill.
Toledo, Peoria & Warsaw	A. H. De Clerq	R. M. Hemphill	Peoria, Ill.
Troy & Boston	Foster Church	R. V. Coon	Troy, N. Y.
Toronto, Grey & Bruce			Toronto, Can.
U			
Union Pacific	I. H Congdon	Geo. E. Stevens	Omaha, Nebraska.
Utica & Black River	Wm. E. Granger	David James	Utica, N. Y.
Utica, Chenango & Susquehanna	C. H. Brown		Utica, N. Y.
V			
Vicksburg & Meridian	Jas. B. Brown		Vicksburg, Miss.
Vineland			Vineland, N. J.
Vermont Central	J. M. Foss	Milton Sessions	St. Albans, Vt.
Vermont Central	N. L. Davis	F. M. Sessions	Rutland, Vt.
Vermont & Massachusetts	D. T. Davis	Jacob Marsh	Fitchburg, Mass.
W			
Wicomico & Pocomoke			Berlin, Md.
Wilmington, Charlotte & Rutherford	W. A. Gill	Thomas Myers	Laurenburg, N. C.
Wilmington, Columbia & Augusta	George Hall	W. J. Calais	Wilmington, N. C.
Westchester & Philadelphia	John Moyer	N. Pawling	Philadelphia, Pa.
Wilmington & Weldon	John Bissit	John Bissit	Wilmington, N. C.
Wilmington & Western			Wilmington, Del.
West-Jersey	W. McAllister	C. C. Williams	Camden, N. J.
Western Maryland	R. V. Dohoney	J. H. Nussear	Union Bridge, Md.
Winona & St. Peter	F. C. Ford	H. L. Preston	Winona, Minn.
Western North-Carolina	E. H. Marsh	E. H. Marsh	Salisbury, N. C.
Western R. R. N. C	M. W. Atkinson	M. W. Atkinson	Fayetteville, N. C.
West-Feliciana	R. C. Brower		Woodville, Miss.
Western & Atlantic	John H. Flynn	John Sherman	Atlanta, Ga.
Worcester & Nashua	George H Griggs	George H. Griggs	Worcester, Mass.
Welland	William Wells	William Pay	St. Catharine. C. W.
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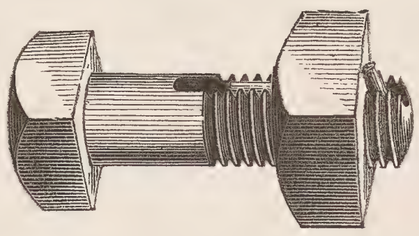
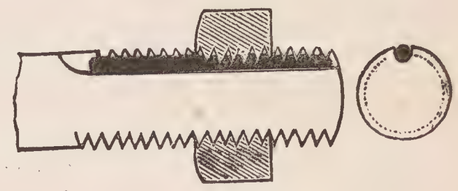


"CUMMING NUT-LOCK,"
Patented
June 16, 1868,
August 23, 1870.



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Unequaled for CHEAPNESS, SIMPLICITY & EFFECTIVENESS.

This simple device, as will be seen by the engravings, consists of a groove being cut in the threaded part of a screw bolt into which is placed a key of copper wire, or other soft metal; when the nut is screwed on, it cuts a thread on the key, thereby making it impossible for the key to get out until the nut is taken off. When the nut is screwed up to its place, that part of the key over which the nut has passed is riveted up against the nut with a small punch, destroying the thread on the key. The nut, therefore, can not move backward until force is used, as with a wrench.

The groove can be rapidly cut with a simple machine designed for the purpose.

Experience has proved this device absolutely reliable, and it is the cheapest of all known devices for the purpose. By its use, old bolts on which the nuts have become too slack for use can be made as good as new, making it a great saving to railroad companies and others in that item alone. It is cheaper than a check-nut.

If the bolt should become slack from shrinking of timber or other causes, *the nut will always remain firmly attached to the bolt*, and, with the wrench, can be screwed up *any distance*, and the wire riveted up any number of times, or can be taken off without injury to the nut or bolt.

This is the only method in use that locks the nut firmly to the bolt without regard to place or surroundings, all others require some attachment that holds the bolt in its position, and a washer or other attachment to keep the nut from turning.

DIRECTIONS FOR USE.—Place the copper key in the slot, pointed end out, and beveled side up, in such a position that when the nut is screwed to its place about three-eighths of an inch of the key will project beyond its outer face. Then screw the nut to its place *over the key*, allowing it to cut its own thread in the copper. Then take a narrow flat set punch, and rivet the projecting part of the key *solidly* against the outer face of the nut. To tighten the nut: screw it up, and rivet the key tighter. To remove the nut: simply apply the wrench and unscrew the nut. It will cut its own way out through the copper. The same key can be used several times, by moving it outward a few threads in the slot.

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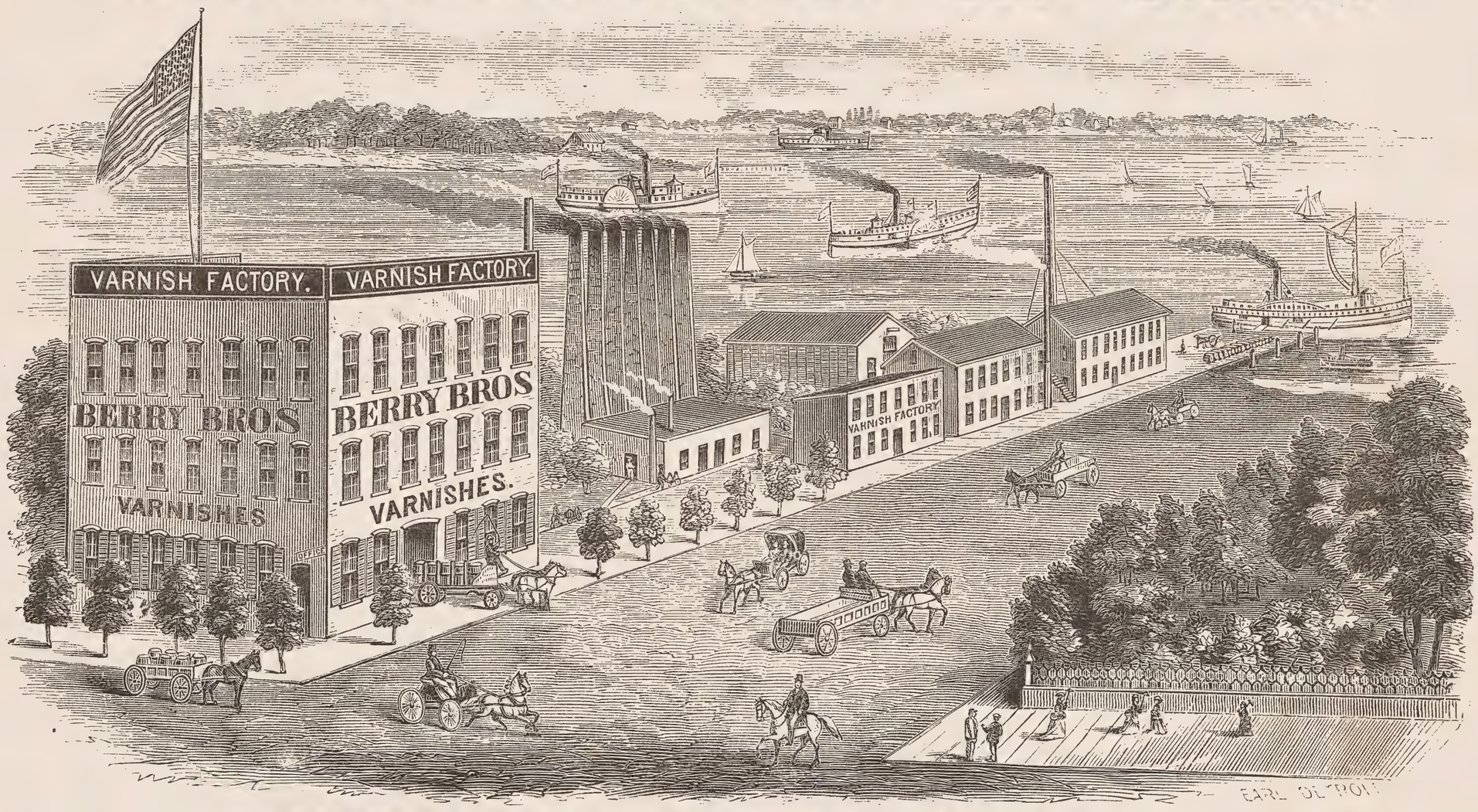

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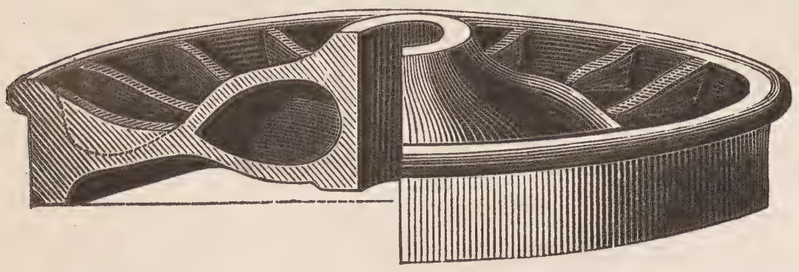

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Improved Paint Filling.

Patented February 8th, 1870.

A COMPOSITION OR FILLING FOR

Cars, Engines, Locomotives, Tenders, Coaches, Carriages, Steamboats, Safes, Piano Plates, Tools, Machinery, etc., etc.

This article possesses, unquestionably, superior advantages over all other Fillers now in use, from the following considerations—namely: Its elasticity is such that it will not peel, crack, nor blister. It possesses great durability, and is unequaled for hardness of surface and smoothness of texture, consequently it presents a beautiful groundwork for the reception of colors. It is a quick, firm dryer—two coats can readily be applied in a day—where great dispatch is necessary three coats may be put on in the same time. It is an *easy* rubber, saving fully one half the time usually employed in that heretofore unpleasant work—the part of painting which has been the most tedious of all, but now rendered easy, rapid and pleasant by the use of the improved Paint Filling. Its composition is such that the pores of the Pumice or rubbing stone are kept perfectly free and open during the entire process of rubbing, while other Fillers have a tendency to choke or fill up the pores of the stones, and thus render them useless or ineffective until cleaned or scraped off, which process is both slow and troublesome. It is therefore apparent that by the adoption of this article both labor and material would be economized. It comes in the form of a stiff Paste, *finely* ground, and when reduced to its proper consistency by the addition of Spirits Turpentine, 1 gallon will be equal to 1½ gallons of other Fillers, thus rendering it comparatively the cheapest article of the kind in the market.

From the many flattering testimonials received by the Patentee from the parties now using it a few only can be appended.

TESTIMONIALS.

MAUCH CHUNK, Pa., Sept. 26, 1870.

The article known as TULLY'S PATENT PAINT FILLER has been used for upward of three years by this Company, on Cars, Engines, Cabs, Wheels, Tenders, etc., etc., and find it an excellent substance for preparing fine surfaces, reducing the time usually spent in rubbing down one third. Wearing well, and with a fair trial, it will prove all that is claimed for it where introduced and placed before the public, as the best result of many years' experience obtained by a thoroughly practical Painter.

A. MITCHELL, *Master Mechanic,*
L. & M. Division of L. V. R. R.

We fully concur in the above.

JAMES I. BLAKESLEE, *Sup't of*
L. & M. Division of Lehigh Valley Railroad.
A. G. BROADHEAD, JR., *Sup't*
Beaver Meadow Div. L. V. R. R.
PHILIP HOFECK, *M. M., B. M. Div.*
JOHN I. KINSEY, *M. M., L. V. R. R.*
DAVID CLARK, *M. M., Hazleton Div.*

Having full confidence in the men whose signatures are attached hereto, I endorse all they say, and confidently recommend Mr. TULLY'S PATENT PAINT FILLER to all in want of an article of the kind.

ROBERT SAYRE, *Sup't and Eng'r,*
Lehigh Valley Railroad.

N. B.—In addition to the "*PATENT PAINT FILLING,*" we manufacture a *Superior Belgian Varnish Filler,* designed to fill the grain of Hard and Fancy Woods used in the construction of Passsenger and Sleeping Cars. By its use from *Two to Three* Coats of Varnish are saved. Also, a *Scraping Filler* for Cars, Locomotives, Cabs, etc., to be *used where great dispatch is required.*

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Superior Belgian Varnish Filler,	
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Directions for use accompany each package.

J. W. TULLY, Patentee and Gen. Agent.

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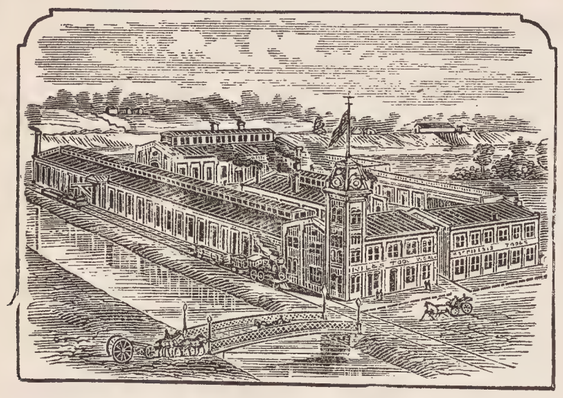

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Car Axle Lathes, (Gray's Patent,)
Car Wheel Borers,
Hydrostatic Wheel Presses, etc.

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PATENT ELASTIC FELT

For Car Seats, Mattresses, and Pillows.

ERIE AND ATLANTIC SLEEPING COACH CO.,
General Offices, 309 West 23d Street,
NEW-YORK, March 26, 1872.

F. W. BLOODGOOD, Esq., *President Patent Elastic Felt Co. P. O. Box 129, Jersey City, N. J.:*

DEAR SIR: Press of business and absence from the city has prevented me from saying to you earlier, that our experiment the past year, in using your Patent Elastic Felt for Pillows and Mattresses, in the coaches of this Company, has proved entirely satisfactory, and that I now regard it as decidedly preferable to hair and feathers. It does not pack like hair, is soft, durable, and withal cheaper. Respectfully yours,
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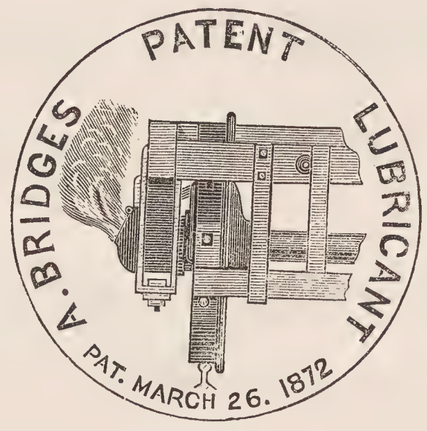

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In presenting this Lubricant to the notice of Railroad and Steamboat Managers and Operators in Machinery generally, I do so with a practical knowledge of its merits, and with confidence that it will be found to possess invaluable qualities as a

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It has been in use, during the past two years, on a number of Railroads and Steamers, and is highly approved of.

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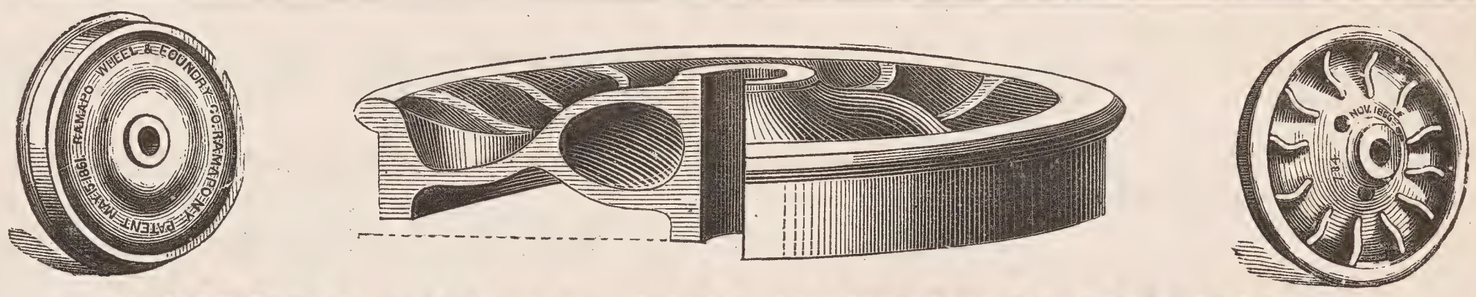

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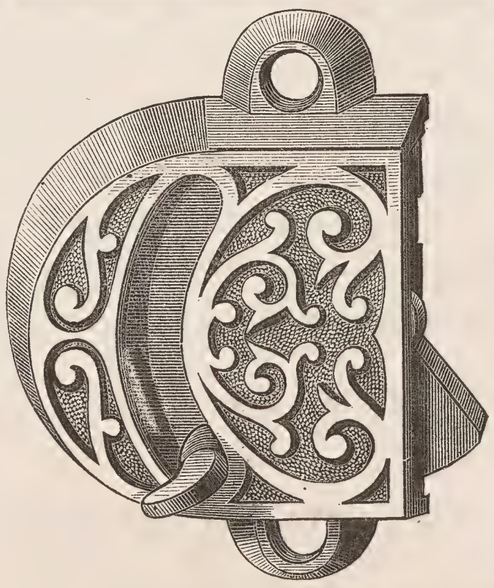

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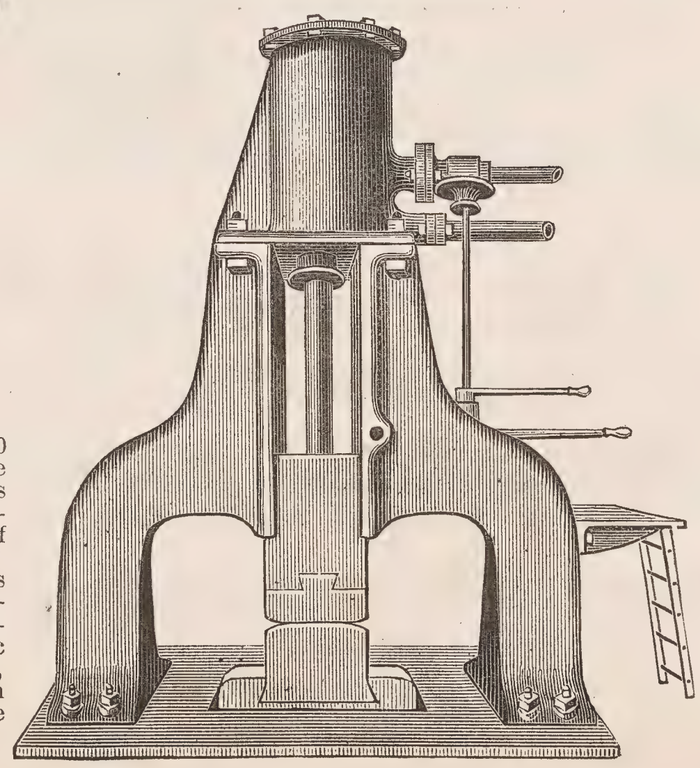

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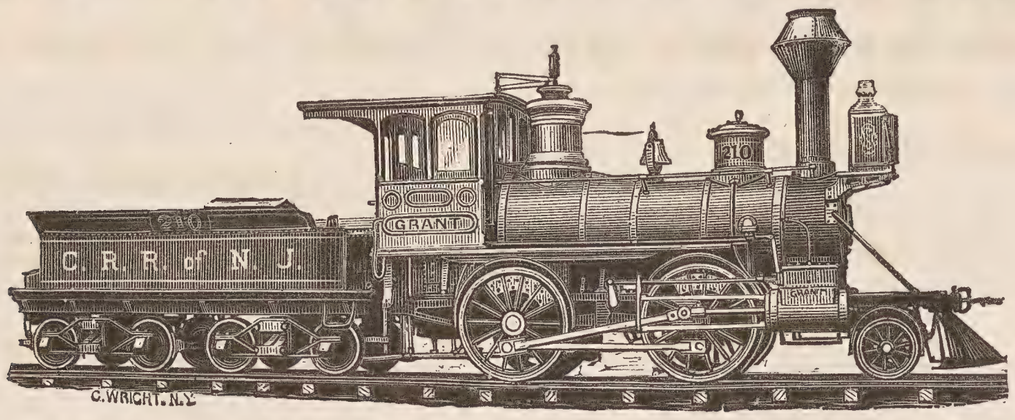

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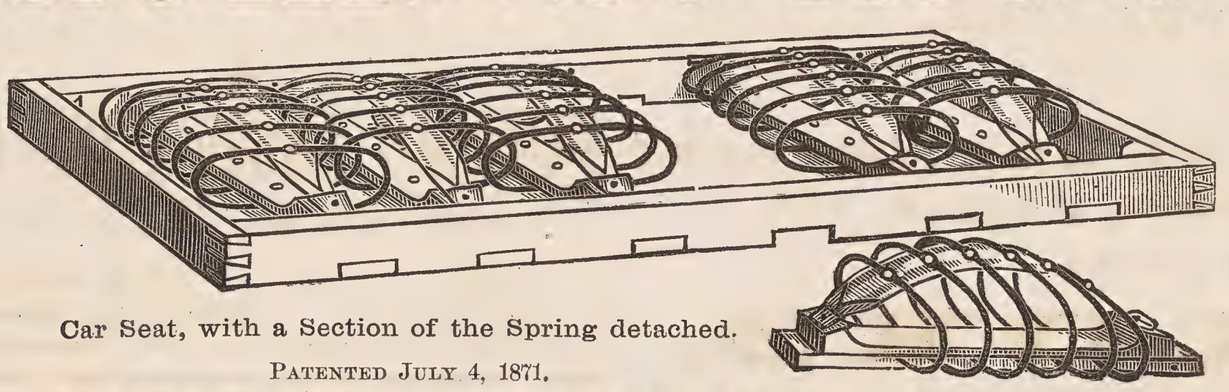

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FOR CAR SEATS AND SPRING MATTRESSES FOR SLEEPING CARS.

These Springs have been in successful operation on a large number of the leading railroads in the United States for over three years.

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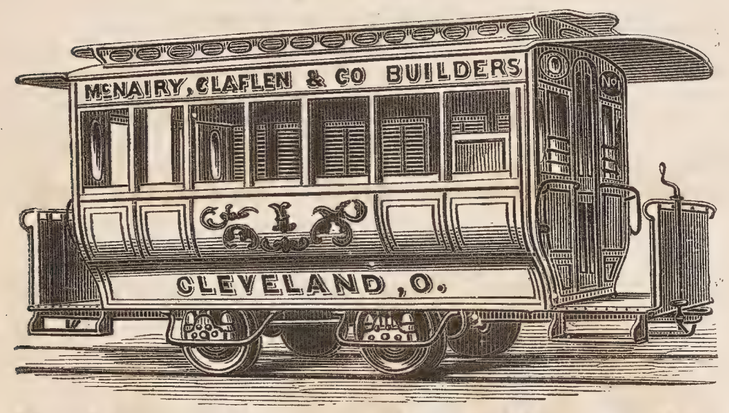

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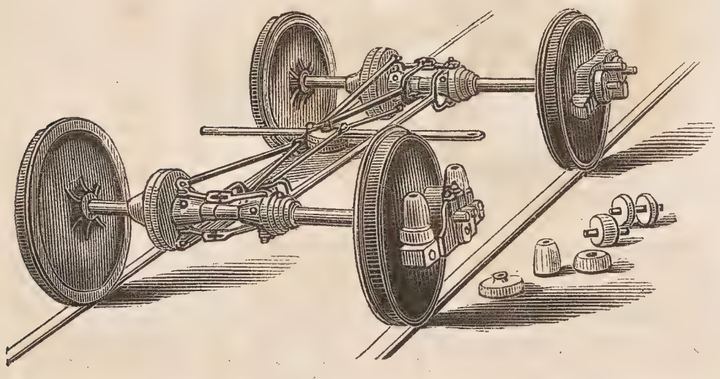

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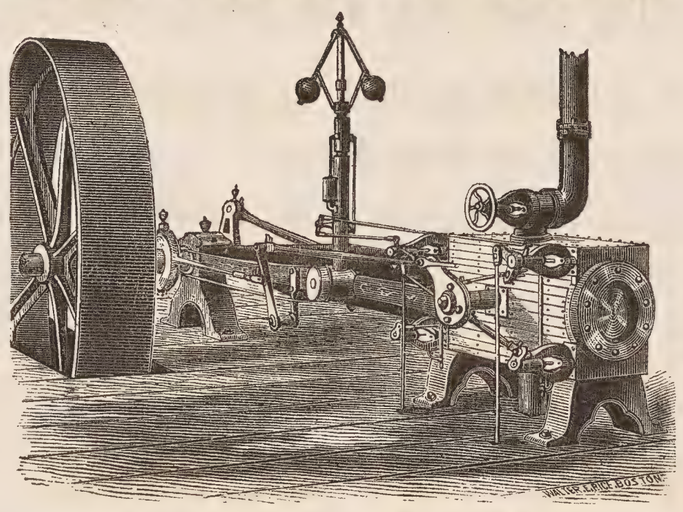

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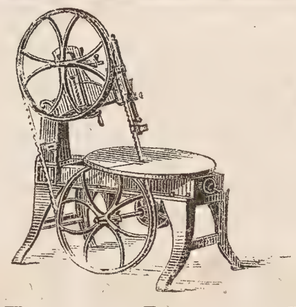

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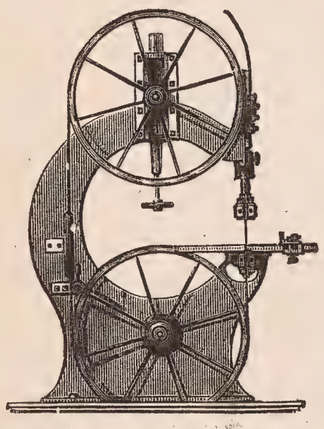

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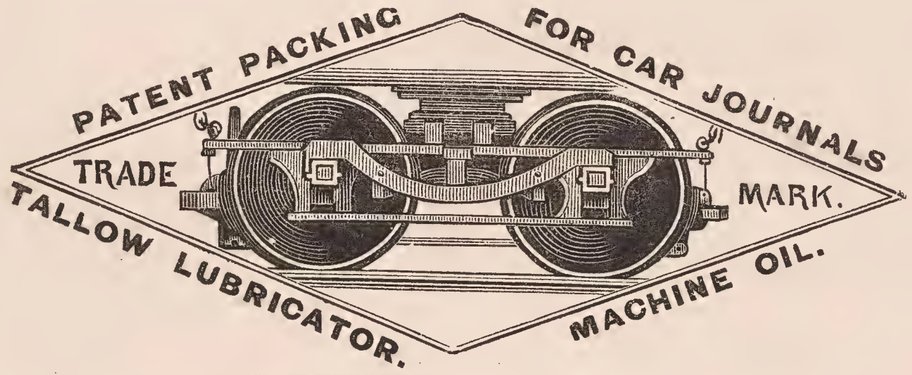

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THE MOST RELIABLE PREVENTIVE OF HOT JOURNALS.

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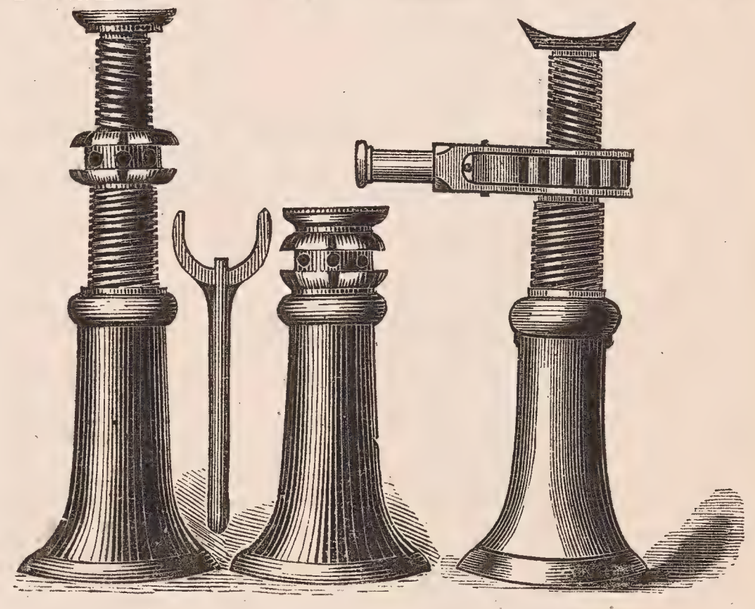

Hot and Cold Punched Nuts, Bolts, Lag Screws and Washers. Belting, Packing Hose, Rubber Springs, Car Trimmings, Steam Pumps.

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Manufacturer and Dealer in

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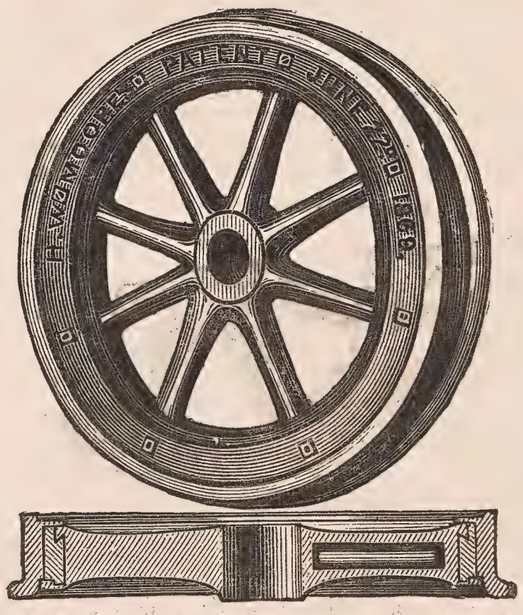
Steel Elastic Car Wheel Co.

OF NEW-JERSEY.



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ELASTIC CAR WHEELS,

for PASSENGER and SLEEPING COACHES.

Noiseless, Elastic Durable, and Economical.

MANUFACTURERS OF CAR WHEELS

of every description, fitted to axles.

Works, **Cor. Greene and Wayne Sts., Jersey City, N. J.**

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Yard and Steam Saw-Mill, Foot 8th Street, E. R.,

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VENEERS

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HARD-WOOD BOARDS.

We have just received a choice assortment of

French Black-Walnut, Amboine, Thuya and Hungarian Ash Veneers; also, a small lot of California Laurel, Red Wood, and Red Wood Burl.

The above, with our usual attractive stock of Veneers and Hard-Wood Boards in Mahogany, Walnut, Cedar, etc., are offered to the attention of

CAR BUILDERS.

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Manufacturers of

Ornamental, Ground, Cut, and Embossed Glass for Railway Cars, etc.

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JOSEPH F. PAUL & CO.,

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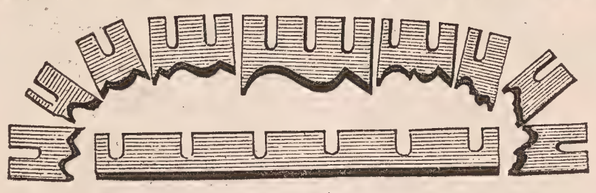

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MACHINE KNIVES, Etc., Etc.,

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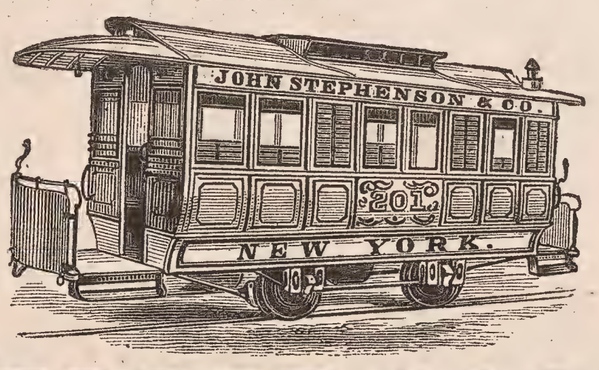

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Of every Variety, and combining all valuable Improvements.

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Cut, Embossed, and Plain Glass furnished in large or small quantities, and with dispatch.

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MANUFACTURERS OF

Chilled Iron Car Wheels

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New-York Office: No. 93 Liberty Street.

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JAMES M. MOTLEY, PRESIDENT.

Mason's Sperm, Manhattan Signal, Extra Lard, Tallow, and Mystic Coil Oils.

Also, Sperm Elephant, Whale, Paraffine, Machinery Elaine, and Olive Oils, for Railroads, Steamers, Woolen and Cotton Factories. Machinery and Burning.

To Car Builders.

Cold drafts around car windows and doors in Winter **ENTIRELY EXCLUDED;** also, **Dust** and **Cinders** in Summer by **BROWNE'S** Metallic **RUBBER** Window and Door Bands. Stood the test **10 YEARS** on Drawing-Room and Sleeping Cars in the United States and Europe.

"Office of Drawing-Room and Sleeping-Car Co.,
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"I have used, for several years, **BROWNE'S** Patent Metallic Weather Strips and Window Bands on our Drawing-Room and Sleeping-Cars to my **ENTIRE** satisfaction. They do not **CONTRACT** when exposed to the heat of the sun, nor **WARP** or **SPLIT;** and, in fact, they are a **STAPLE** article of practical utility, and I cheerfully recommend them.

"W. WAGNER, PRESIDENT."

For Circulars, Price-List, and Samples, address,

The Patent Metallic Weather Strip Co.,

812 Broadway, New-York.

Railway Machinery and Supplies.

L. G. TILLOTSON & CO.,

MANUFACTURERS OF

Railway Car Findings.

PLUSH IMPORTERS.

RUBBER GOODS,

COTTON WASTE.

DEALERS IN

RAILWAY SUPPLIES

OF EVERY DESCRIPTION.

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Fancy Woods of the Choicest Kinds.

ITALIAN AND FRENCH WALNUT VENEERS,

HUNGARIAN ASH.

Butternut and Black Walnut Burls, Corrugated Ash and Black Walnut, Amboine, Thuya, Tulip, etc.

Mahogany and Walnut Planks and Boards, of Standard Thicknesses.

A. PARKER & CO.,

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WITH BEST TOOLS ONLY.
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J.T.PRATT & CO
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WROUGHT IRON PIPE FOR STEAM, GAS, AND WATER,

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New and Improved Machinery for

COAL GAS WORKS.

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Devoted to the Interests of Railway Rolling Stock.

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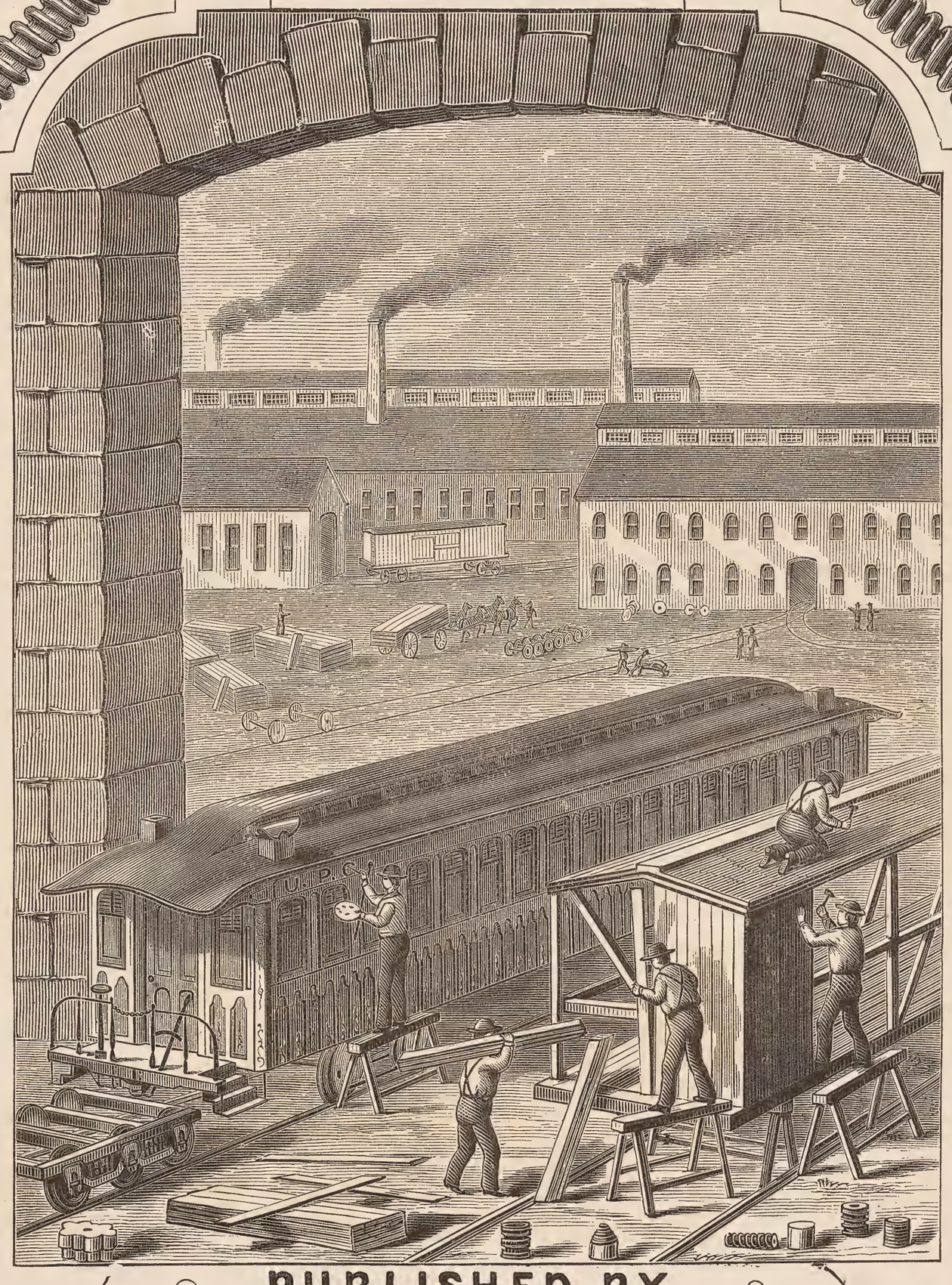

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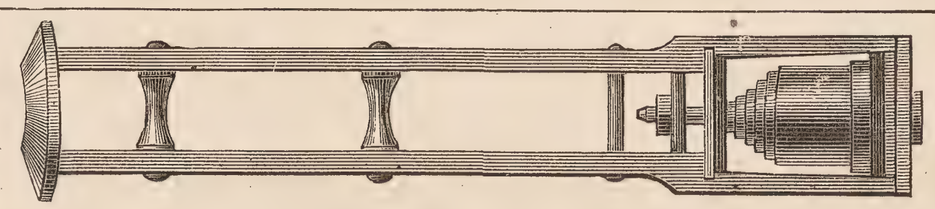

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DESCRIPTIVE PRICE-LIST

(UNIFORM TO ALL)

OF

RAILWAY VARNISHES.

LAWSON VALENTINE.
HENRY C. VALENTINE.

APRIL 1, 1873.

OFFICE: NEW-YORK.
FACTORY: BROOKLYN.

FINISHING.

FREQUENT WASHING WITH COLD WATER WILL IMPROVE ITS LUSTRE AND HASTEN ITS HARDENING.

		Per Gallon.
Railway Body Varnish, . . . *(For finishing-coats on outside of Cars.)*	This Varnish differs from the Finishing Body Varnish used on carriages, in hardening free from tack more quickly, thereby rendering it more effectual in resisting cinders and dust. It is very pale, and dries out of the way of dust in about twelve hours. In working, fullness, lustre, and durability, it is unsurpassed. On old work, one, or at the most, two coats are sufficient. On new work, it is economy to use two or more coats over our **Hard Drying Body.**	$5 50

RUBBING.

Hard Drying Body Varnish, . *(For under-coats outside, and finishing inside, also for finishing Locomotives.*	This Varnish dries in eight to ten hours, and hardens so as to rub well in about four days. It is fully equal to our **Railway Body** in paleness, fullness, and lustre, and is much used for finishing over a leveled surface on hurried work not requiring the greatest durability. For best inside work it is particularly adapted.	5 00
Quick Leveling Varnish, . . . *(For under-coats on Locomotives and inside work, or for quickening the Hard Drying Body and Railway Body.*	This Varnish dries quicker and harder than our **Hard Drying Body.** In good weather it will harden so as to rub well in two days without sweating out. It is sufficiently pale for any light work. On outside work it should be protected with our **Railway Body.**	4 00

MISCELLANEOUS.

No. 1 Black Varnish, ... *(For smoke-stacks and other iron work.)*	This is an Elastic Black Varnish for Smoke-stacks. It dries and wears well. A little **Railway Body** mixed with it will improve it in lustre and durability.	1 50
Japan Gold-Size, ... *(For binding, drying, and hardening colors.)*	This is a superior oil-drier, of light color, and strength nearly double that of ordinary Japan. On account of its paleness and the less quantity required, it is especially valuable for use with light paints, and being an oil-drier it is much less hurtful to the work than Japan. Once known, it is indispensable to Car-Painters, for binding colors, mixing roughstuffs, and facilitating their drying and hardening through.	3 50
Crown Coach Japan, ... *(For drying and hardening paints.)*	This is a light-colored, strong-drying shellac Japan, for hardening colors, and is well adapted to the use of the car-painter.	1 75
Ground Roughstuff, ... *(For producing a hard and level surface on bodies of Cars.)*	This is a mixture of mineral substances, combined with great care so as to furnish a dense body with a sharp grit. It is ground in **Japan Gold Size,** and is superior to all other roughstuffs, (sometimes erroneously called "fillings.") When used over a priming of one coat of **Permanent Wood Filling,** the first coat should be made elastic with raw oil, and the following coats reduced with turpentine, if required for working.	3 00
Dark Permanent Wood-Filling, *(A patent article for priming outside work, and permanently filling and darkening natural woods.)* **Light Permanent Wood-Filling,** *(Precisely same article as above, but being light colored it fills without staining the natural wood, and is specially adapted to priming Cars.)*	This article, being a very penetrating and non-evaporating anti-damp of extreme durability, is a perfect and permanent filling for the pores of wood. Experience has proved that it will not only support the color and varnish better and longer than the old method of lead priming, but that on account of its permanent elasticity, it will neither crack nor flake off; besides which, it saves time, labor, and cost, and is more convenient, cleanly, and healthful.	4 00

Goods put up in 45-gallon barrels and 45-gallon sealed cans, cased, with no charge for packages. Twenty Cents per gallon off for all goods in barrels and Five per cent off for cash.

We claim that our *Finishing Varnishes* are unsurpassed in the following qualities:

UNIFORMITY, PALENESS, FLUENCY, RELIABILITY, DRYING,
HARDENING, FULLNESS, BRILLIANCY, DURABILITY, ECONOMY.

Valentine & Co.

88 Chambers Street, New-York.

LANSDELL'S
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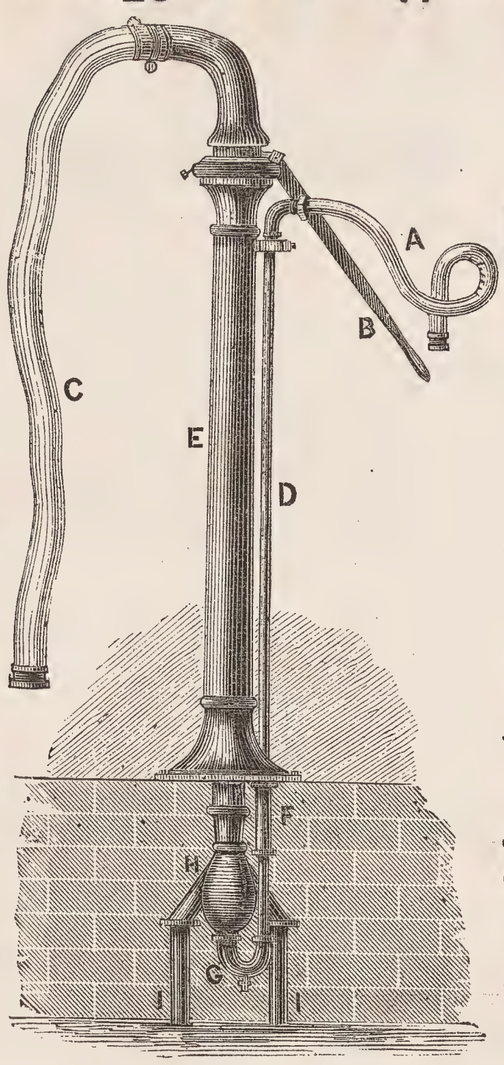
DISPENSES WITH **Tanks, Tank Houses, Stationary Power,** AND **Attendance.**

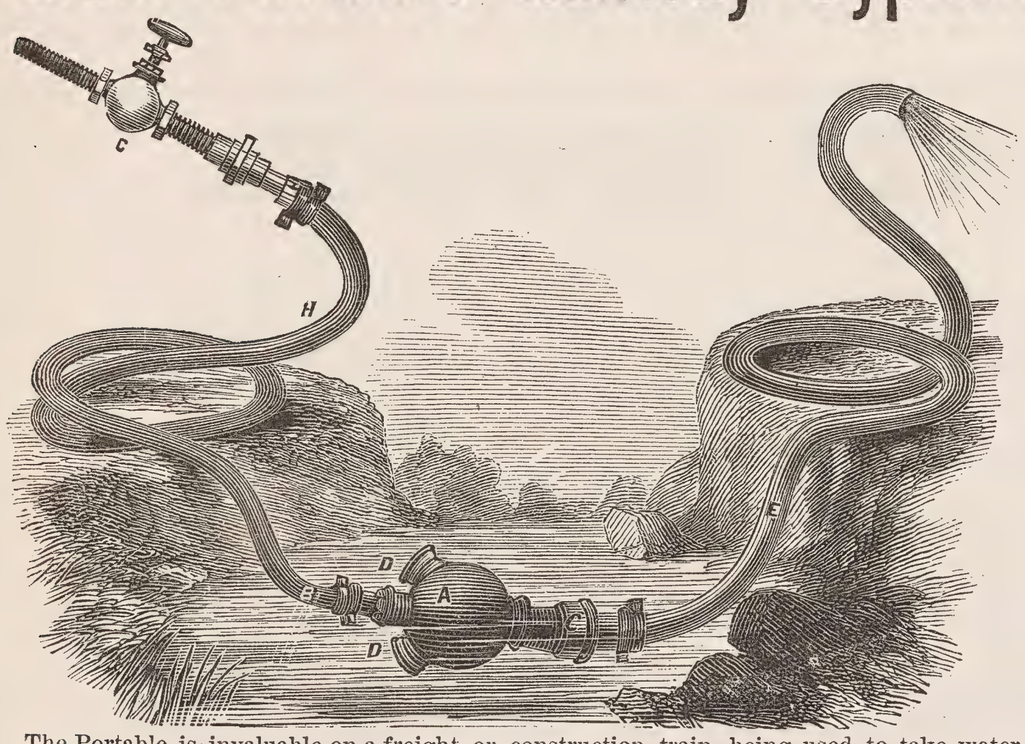


CAN NOT **FREEZE** IN ANY **CLIMATE,** UNDER ANY **CIRCUMSTANCES.**

Costs Less THAN ONE HALF THE PRICE OF A **Frost Proof TANK.**

The Engineer in charge of the Locomotive attaches the Hose A to a steam valve in the boiler. Steam passed through the pipe D and slip joint F into the globe H, producing a vacuum; the water is then lifted through the pipes I I and forced through the column E and hose C into the tender, filling any ordinary tender in about three minutes. When steam is shut off all the water in the pipes returns into the well, and any condensed steam passes off through the drip valve G, leaving nothing to freeze. The handle B serves to turn the discharge pipe and hose in any direction. The water delivered into the tender is warm, thus utilizing the steam used. The discharge tubes, represented above made of hose, can be made of iron if preferred.

LANSDELL'S
Patent Portable Railway Syphon.



The Portable is invaluable on a freight or construction train, being used to take water at points where there are no water stations. With it water can by taken from any point within one hundred feet of the track where there is water six inches or more in depth. The valve C is tapped into the locomotive boiler; steam is let on through the hose B; water is drawn through the orifices D D, and forced through the hose E into the tender, filling any tender with warm water in from six to twelve minutes.

Lansdell's Patent Steam Syphons, Double Suction, adopted by the United States Board of Supervisors, and approved by the Secretary of the Treasury for use on Steamboats.

For Price and particulars, apply to the General Agents of the STEAM WATER STATION COMPANY,

LENG & OGDEN,

IRON AND STEEL DEALERS AND IMPORTERS,

4 FLETCHER STREET, NEW-YORK,

Sole Agents for Credenda Steel Gun Barrels and Moulds, and the Cold Drawn Patent Weldless Steel Tubes.

Noyes' Patent Liquid Packing

For Cooling and Lubricating Railroad Car and Steamboat Journals of all kinds.

The attention of Railroad men, as well as all others who are running heavy journals is respectfully invited to the above Liquid Cooler. It has been successfully introduced on several Railroads, and is constantly growing in favor as its merits become known, and we are confident that practical men can not fail of being convinced that our preparation deserves their candid attention. What we claim for it is:

That it will cool a journal while a car is in motion, and that its use will in a great measure prevent its occurrence, saving expense, delays, and accidents; that mixed with mineral oil it gives a soft heavy body, essential elements which this oil lacks, especially in warm weather, besides keeping it sweet and preventing oxydation; that a journal will wear longer and with less friction, and be better and more thoroughly oiled; that the heat from the journal is thrown off at a temperature below that required to melt the babbitt, saving it from being destroyed, and preventing an accumulation of heat; that there is less liability of waste packing of journal getting on fire, as the non-inflammable elements of the Liquid permeates the waste and prevents it; that it will cause a considerable saving in the expense of oiling, as it imparts additional lubricating qualities, as well as body which prevents waste from running off, keeps the journal smooth and polished, and hardens the bearings; that a trial will satisfactorily demonstrate its superiority to sperm or lard oil, and that used according to directions it is even cheaper than mineral oil, which is the lowest-priced lubricating oil in the market.

We do not claim the Liquid Packing as a *durable* lubricator of itself alone, but when used with good mineral oil according to directions, we do claim that it constitutes a cheaper, better, and more durable lubricator than any thing offered for the purpose under whatever name.

One thorough application of the Liquid on a hot journal will do more execution in cooling, than the constant application of water for half an hour, besides doing it evenly and without loss of time.

DIRECTIONS FOR USING.

FOR COOLING OFF A HOT JOURNAL WHEN CARS ARE IN MOTION.—For this purpose procure a can holding two gallons, the nozzle having an outlet of not less than half an inch, and always keep it well filled with the Liquid Packing for immediate use. When a hot journal is discovered, apply the Liquid slowly, first giving the contents of the can a thorough shaking, and then proceed. Examine journal at next station, and if not cooled down to a proper temperature, apply again, and so on until it is accomplished, then fill up the box with native lubricating oil; this is particularly necessary in all cases where animal oil is used as a lubricant. In all ordinary cases this treatment will effectually cool off a journal in a short time, and without causing scarcely any delay of train. *Where a box is on fire*, pour on the Liquid which will extinguish the fire immediately. In extreme cases, where the babbitt metal has melted, or where journals are extremely rough, the journal may become hot again. If so, repeat application of Liquid as directed, and then fill up box with native oil, and so on as often as may be necessary to the end of route. A can of the Liquid Packing, together with a can of native oil, will insure the safe delivery of cars troubled with hot journals, with scarcely any delay. A smoky and hazy emanation from boxes in which the Liquid is used, simply indicates a rough journal, and that the heat is being conveyed away from it. In such cases look to it occasionally, and keep it well supplied with the Liquid. Should the Liquid become too thick to run freely from the nozzle of can, from the action of the weather, thin to the required consistency with mineral oil.

FOR A GENERAL LUBRICATOR.—Add one part of Liquid Packing to two parts of native West-Virginia or paraffine oil, and use in regular way. Or, if preferred instead, use the Liquid Packing in every third or fourth oiling, according to the temperature of the weather and quality of oil. Used in this way, aside from its cooling qualities, it makes a lubricator that can not be excelled in price and quality.

WHAT RAILROAD MEN SAY OF IT.

MR. NOYES: FITCHBURG, MASS., Aug. 20, 1872.

Dear Sir: I have used your Liquid Packing for the past four months, and am perfectly well satisfied that it is the most effectual article ever in use for the purpose claimed. I have just ordered another barrel. If all railroad companies would adopt your Liquid Cooler, I think they would find a saving of nearly 20 per cent. when used with mineral or black oil according to your directions, JACOB MARSH, *Master Car-Builder Troy and Greenfield R. R.*

MR. P. NOYES: SALEM, MASS., Aug. 7, 1872.

Dear Sir: I have been using your Liquid Packing for cooling car journals, for some time past, and have been well pleased with it. I have had occasion to use it a number of times, under Pullman Cars, and it has been a complete remedy in every case of hot journals.

Every train should be provided with it, as it is a saving of time and expense in the running of trains, provided it is applied and cared for according to directions for using.

J. P. SOMERBY, *M. C. B. of Eastern Railroad.*

MR. P. NOYES, Agent: WORCESTER, MASS., July 11, 1872.

Dear Sir: Please send us another barrel of your Liquid Cooler. Have been experimenting with it for the past six months, and find it all you recommend. It can not fail of accomplishing the work, and with it and a can of native oil, can deliver my cars any where in good condition. I find, however, as you stated, that it will not work with amimal oil, but with mineral oil, and when used according to your directions it works entirely satisfactory. I shall take especial pains to pass its merits along. OSGOOD BRADLEY, *Car Manufacturer.*

MR. NOYES: OFFICE OF NORTHERN RAILROAD, CONCORD, N. H., May 26, 1872.

Dear Sir: Send to this corporation a barrel of your Liquid Packing. The sample package cooled four hot boxes within a distance of eight miles. I shall have a can on board each train, for it gives perfect satisfaction. A. LANGMAID.

P. NOYES, Esq.: ALBANY, Nov. 1, 1872.

Dear Sir: I received the barrel of Liquid Packing you sent me for trial, and gave it out to our most experienced conductors to use according to directions. Below please find their report:

We, the undersigned, Freight Conductors on the Eastern Division of the N. Y. C. & H. R. R. R., have used the Liquid Packing furnished by Mr. Jones, and find that when we arrive at a station with a hot journal, the Liquid Packing cools it sufficiently by the time we arrive at the next station to use the Black Oil, and then have no trouble in getting through with it. It is the best we ever used. R. H. FISHER, A. W. GETMANS, R. H. HEATH, WM. HESS, Conductors E. DIV. N. Y. C. R. R.; I. FERGUSON, Conductor H. R. R. R.

MR. P. NOYES, Agent: BOSTON, MASS., Aug. 22, 1872.

Dear Sir: In regard to the working of your packing, all I know about it is, that I was at Ayer Junction a few days since, when the Boston Express train arrived with a hot box; it was cooled off and oiled; when the car arrived at Fitchburg it was quite hot; your Packing was used there, and the car went on to the Hoosac Tunnel, and I found it cool on arrival.

C. L. HEYWOOD, *Sup't Fitchburg Railroad.*

BELT AND LEATHER STUFFING CO.: NEW-YORK, PROVIDENCE, AND BOSTON R. R. CO., PROVIDENCE, Aug. 3, 1870.

Gentlemen: Some two months since I received from you a can (1½ galls.) of your Liquid Packing for cooling Journal Bearings on cars; I had just repaired and put to running an engine; the first trip the truck boxes (all new) heated badly. I gave the Liquid Packing to the engineer and instructed him to use it according to directions. The consequence was that we had no more hot truck boxes. I was so well satisfied with it that I ordered a barrel, and for the past month, when we have a hot box on any of our cars, we apply at once your Liquid Packing, which has in all cases, thus far, cooled the journal so as to give no further trouble or delay. During the past two weeks we have received from the Taunton Car Co. four new passenger cars; the two first when received by us from Taunton had each journal VERY HOT, with the babbitt metal melted out of brass shells, I renewed the metals and packed them with your Liquid Packing. The cars have been running 150 miles each day ever since, WITH NO MORE HOT BOXES. Some ten days since we received from the N. L. & N. H. R. R., at the Ferry Boat at Groton, (through express train from New-York to Boston, shore line,) a car having a red-hot box; your Packing was at once applied, cooling the journal so that the men were able in a few moments to put in a new metal; they then repacked with your Liquid Packing, according to your printed directions, and the car came into Providence, a distance of sixty-three miles, perfectly cool, without any further trouble. If it continues to work as well, I can not do without it. I cheerfully recommend it to all Railroads, as being an article which they will find invaluable in all cases of hot journals.

J. H. ANDERSON, *Master Mechanic.*

Send for a barrel. No charge unless it does all we state.

MANUFACTURED BY THE

BELT AND LEATHER STUFFING CO.,

47 INDIA STREET, BOSTON.

ALSO BELT DRESSING for preserving belts, and preventing them from slipping, and CABINET OIL TANKS for storing, drawing, and measuring oil, of all sizes.

FULLER, LORD & CO.,

Machine-Forged Nuts,

BOLTS and NUTS,

WROUGHT WASHERS,

BOONTON CUT NAILS,

139 Greenwich, Street,

NEW-YORK.

ENGLISH FIRE BRICKS

AND CLAY RETORTS.

HAMMILL & GILLESPIE,

240 & 242 Front St., New-York,

Are constantly receiving all the best brands of

Foreign Fire Bricks, Clay Retorts, Fire and Crucible Clays, Portland and Roman Cements, Etc., Etc.,

which they offer in lots to suit, from store or to arrive, at greatly reduced prices.

Hitchcock Car Ventilator.

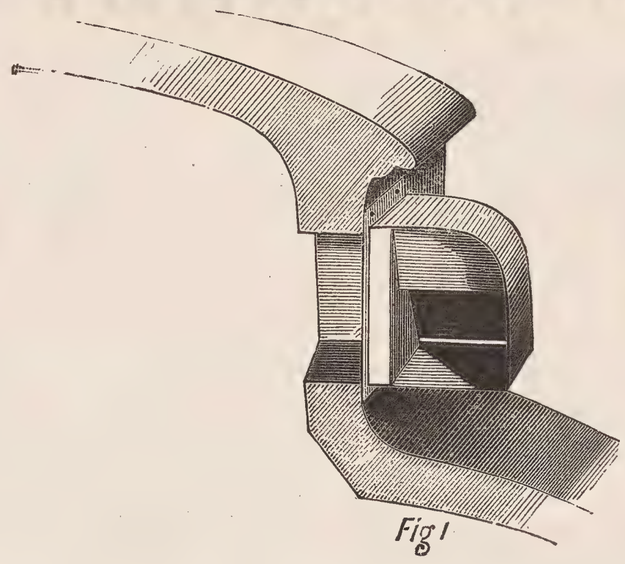


Fig 1

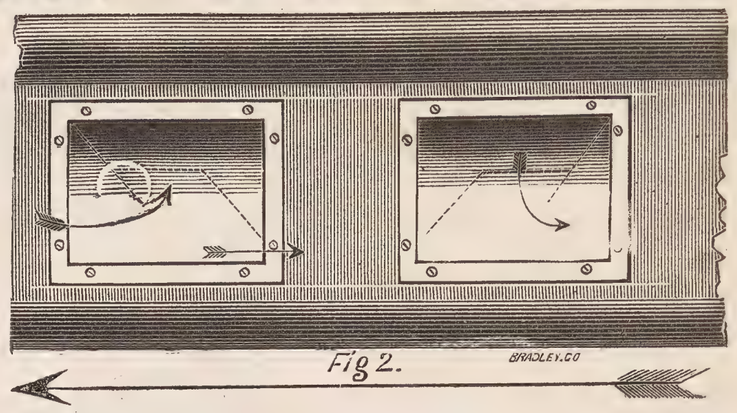


Fig 2. BRADLEY.CO

THE Ventilators are placed as usual in the car roof as shown in Fig. 1, their mouths facing alternately in opposite directions, those facing forward admitting the air, and those facing backward affording an exit. Fig. 2 represents a side section of the raised roof with two of the ventilators alternately arranged. When the car is moving in the direction indicated by the arrow, it will be seen, by the curved darts, that there is an ingress and egress of air constantly taking place. The operation of the ventilators is reversed with precisely the same effect, when the car moves in the opposite direction. The internal structure is such that the dust and cinders passing into the mouth of the ventilator are intercepted by striking against two shields, shown in Fig. 1, and indicated by dotted lines in Fig. 2, and are thus naturally thrown to the bottom, where they are carried out through a small opening as shown in Fig. 1, and by the straight dart in Fig. 2, a current of pure air being forced into the car at the same time through a lateral opening. The faster the car moves, the greater is the quantity of air admitted and expelled, thus securing a free circulation which does not subject the occupants to a direct current or draught. The ventilator is also noiseless in its operation. There is no clattering of valves, and no change is necessary when the car reaches its destination. Once put in place, it is always in readiness, and runs itself independent of all employees.

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ROBERT HITCHCOCK, Inventor.

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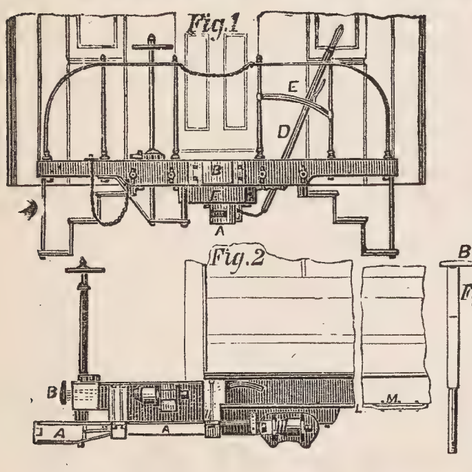

Fig.1

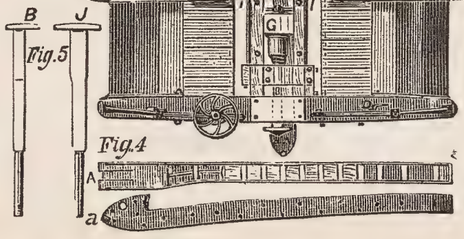

Fig.2

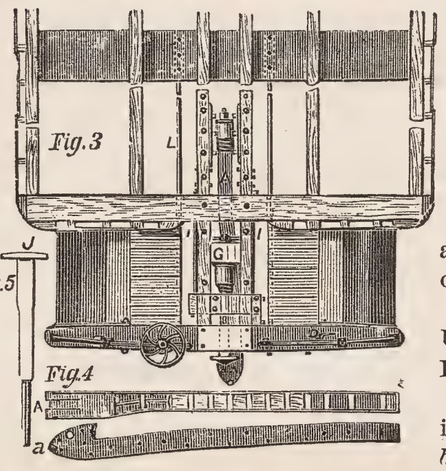

Fig.3

Fig.4

Fig.5

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Send for Illustrated Pamphlet, and call and see working models. E. MILLER, Patentee

DESCRIPTION.

Figure 1 is an elevation; Figure 2, a longitudinal section; Figure 3, a plan of an end of a car to which the arrangement has been applied; and Figures 4 and 5 show top and side views of the "Hook" and "Buffer," drawn on a larger scale than that of Figures 1, 2, and 3.

The letters refer to the same parts in all the figures. A is the coupling "Hook," B the "Buffer," C the "Stop," D the "Lever," E the "Quadrant Ratchet," F the "Truss Beam," G the "Spring Beam," H the "Suspender Beam," I the "Upward Trusses," K the "Main Spring," L the "Downward Trusses," and M the "Bolster."

The Platforms, instead of being located below the centre line of the main sills of the cars, are placed *in* that line, and held there by the Trusses I and L, so that the point of contact (in Buffers B) is *in* the said centre line and *not below* it.

The coupling "Hook" A is attached to the draw spring the same as the ordinary draw head, and at the same height above the track, but in such a manner that the outer end is free to move laterally for a short distance. The Coupling Hook projects beyond the platform. The Stop C is placed under the Buffer Beam to prevent accidental uncoupling. When two cars are brought together, the Coupling Hooks, from *their shape*, push each other aside, until the Buffers B are compressed hard on the Buffer Springs, then—*the points of the hooks having passed each other sufficiently far*—the Hooks are carried forward by their main-springs, and thus the "*Coupling*" and "*Compression*" are both effected automatically *and at the same time*, and without the use of links and pins. When two cars are thus coupled together, the *head* of the *Hook* of each car is under the Buffer Beam of its opposite car, and the platforms are close together, (about 4 inches apart.) The effect of this is, *one platform can not be forced over the other*, nor can a *child* fall between the platforms; the dust and rain are nearly all shut out; the "Compression" makes the train run steadily, and prevents all jerking at starting and stopping.

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And is being rapidly introduced throughout the civilized world. It commends itself to the Traveling Public by ensuring

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And to the Railway Manager by

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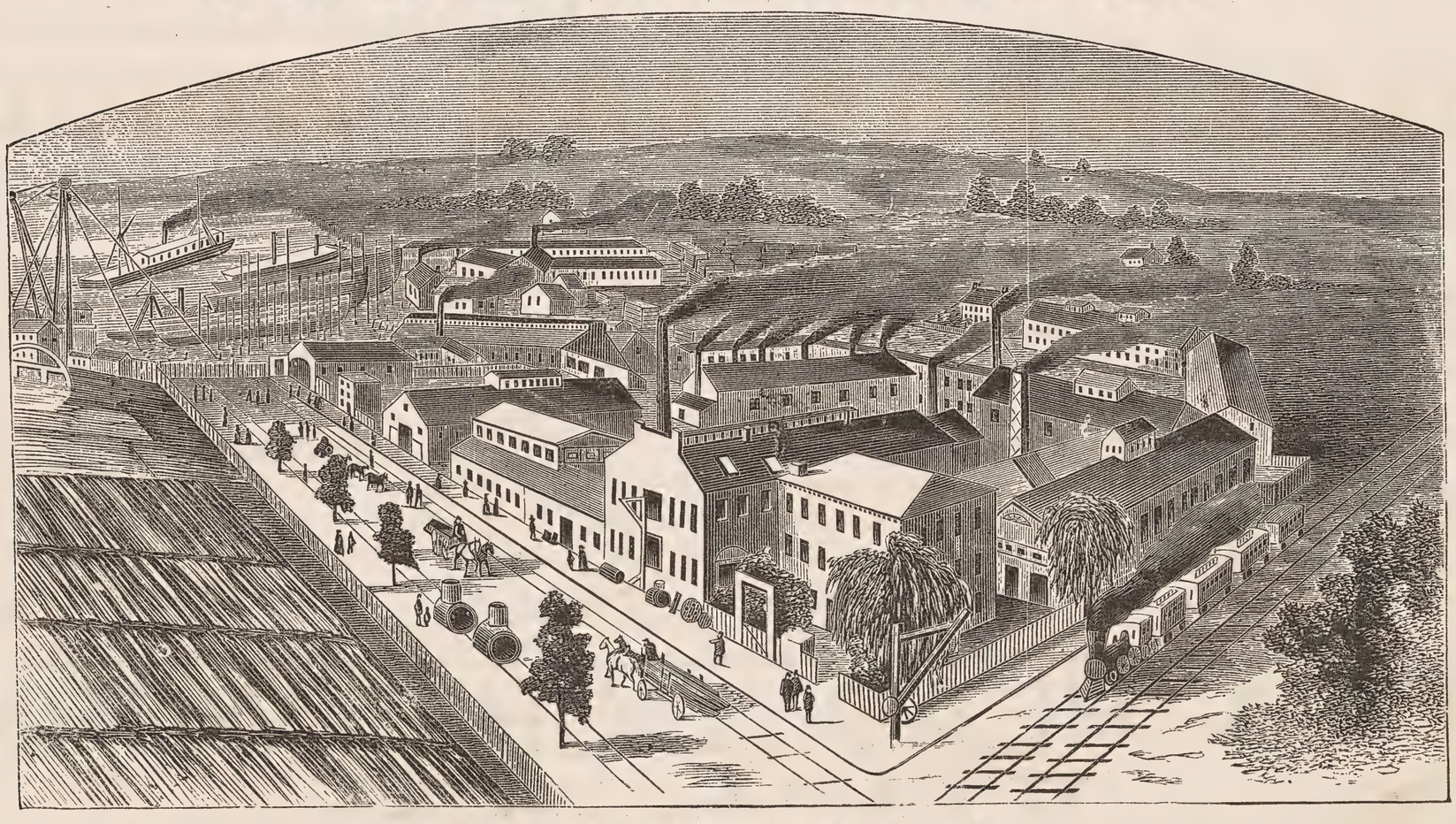

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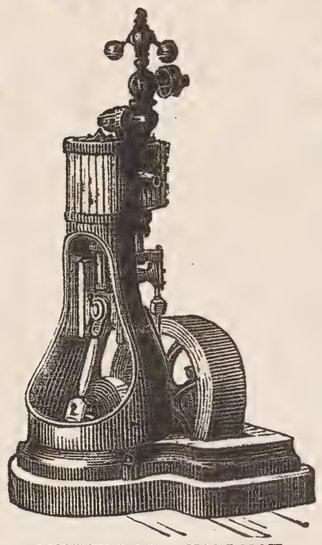
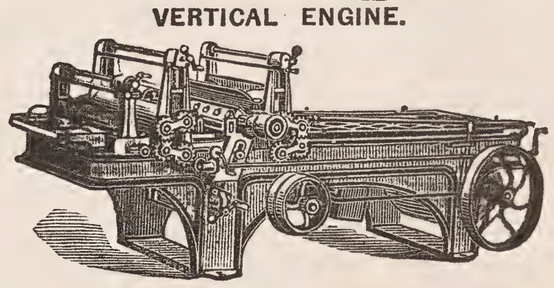
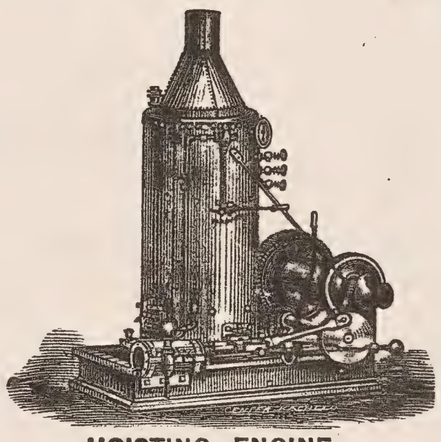


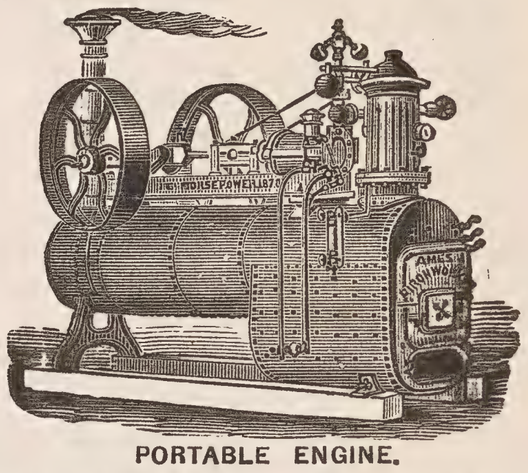
VERTICAL ENGINE.



WOODWORTH PLANER.



HOISTING ENGINE.



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I. A. WILLIAMS, Patentee and Proprietor.

THE NATIONAL CAR BUILDER.

DEVOTED TO THE INTERESTS OF RAILWAY ROLLING STOCK.

Vol. IV.
No. 4.

APRIL, 1873.

One Dollar per Annum.
Single Copies, 10 Cents.

The Gilbert Elevated Railway.

THE *Daily Graphic* contains the following statements relative to the condition and prospects of this enterprise, derived from an interview with Mr. J. Q. Hoyt, the Vice-President of the company :

Starting from High Bridge, at the New-York terminus of the New-York, Boston, and Montreal Railroad, the road comes down Eighth avenue to One Hundred and Tenth street. It then turns to the west into Ninth avenue, runs down to Fifty-third street, where it crosses to Sixth avenue. It proceeds down this avenue to Fourth street, then turns up to South Fifth avenue, and runs to Canal street, where it crosses into West Broadway, and so along to Chambers street. At Chambers street it turns into Broadway to the Bowling Green This may be regarded as its terminus at the city end of the line, though the fact is that the road is continuous ; and the same train of cars runs around the island. From the Bowling Green the line proceeds through Beaver, Pearl, the New Bowery, Division street, and so into Second avenue, and up that avenue to the river, and so to High Bridge. There is a double track all the way round.

The work now is let to the New England Iron Company, for the first ten miles, from the Bowling Green to High Bridge on the west side of the city. The surveys are going on, and the work will be commenced with the laying of the foundations as soon as frost is off the ground, and pushed to completion as fast as possible. The iron-work is already in progress. All the straight pieces are being manufactured at different works, occupying at the present time nearly two thousand men. It is calculated that the iron-work can be prepared, including the curves for corners, and put in position about August or September, for the first five miles. The road can be put up at about the rate of two hundred feet, or a block a day. Of course, as many gangs of men will be employed as it is found practicable to work. The first commencement of putting up the structure will be at the corner of West Broadway and Chambers street, and it is expected that cars will run to Central Park this fall.

The structure will be entirely of the best wrought-iron, graceful in form, of admirable architectural design, and of a strength far beyond all strain that is likely to be produced in working the road. To give an idea of the strength of the structure, it is but necessary to state the facts in regard to a single section of the road. Every section is sixty-six feet long, or sixty-four feet in the clear, and is capable of sustaining 450 tons without breaking. The greatest weight which is likely to be placed on a section would be two thirty-ton locomotives—one on each track—weighing together, sixty tons. Here is a surplus of strength in the structure itself equivalent to 390 tons. But, even if it were deemed desirable to load the section with all that could by any possibility be put upon it, the surplus of strength would still be enormous. No section could hold more than two freight-cars and a half. As each car weighs say ten tons, and the loads are ten tons to each car, this would give a total of say 100 tons, (placed on both tracks in five cars,) giving still a surplus strength of 350 tons. No more than the weight spoken of could by any possibility be crowded upon a section. Every flat piece of iron is tested up to 20,000 lbs. per square inch, without taking permanent set. At 17,000 lbs. it is struck with sledge-hammers. It is tested up to 12,000 lbs. tension. Its compressibility is tested to 8000 lbs. per square inch. Every piece of round iron is subjected to the test of bending at right angles without abrasion. If the slightest suspicion of a flaw is perceived in this test, the bar is rejected. All these tests are in accordance with the specifications and contracts entered into between the contractors and the company.

Pneumatic tubes will be placed under the road, and will be employed for the transmission of packages, newspapers, and so on. The lamps of the city will be fixed to the posts of the road, and upon the top of the structure will be placed the telegraphic wires, thus dispensing with lamp-posts and the unsightly telegraph poles.

The arches will rest upon the posts, and the posts will rest upon solid stone foundations sunk to a sufficient depth at the edge of the sidewalk to make them of a most solid character. Wherever it is necessary, piles will be driven and the masonry placed on top of them.

The ordinary fare will be ten cents for the first four miles, and two cents a mile beyond that. But there is this important regulation : between the hours of five and eight in the morning, and five and eight in the evening, trains will be run at half-fares for the accommodation of the working-classes.

The road will cost about a million of dollars a mile. The stock of the company is already subscribed by about thirty of the leading prominent capitalists of New York, all of them interested in railroads, all desirous of aiding in the development of the city and country. The money for stock will be paid up in full at par. Bonds of the company, at the rate of a million a mile, have already been negotiated in London for the first five miles and a half of the road—from West Broadway and Chambers street, north. The money is to be placed in New-York, in trust for the company, very shortly, and is to be paid over to the company as the work progresses, in this way : Half a million upon the completion of the first mile ; half a million on the completion of the second mile ; a million and a half on the third mile, and so on—eight millions of dollars being now provided toward the completion of the first ten miles, with the bonds of four miles and a half still available.

The road is built in the interest of, and, to a great extent, for the benefit of the Consolidated New-York, Boston, and Montreal Railway. It also equally accommodates passengers by the New-Haven road, the Harlem road, and the Hudson River road, as well as rapid transit. Passengers can get into the Pullman Palace-cars, or the ordinary day-cars, at West Broadway and Chambers street, and go directly through without change to Boston, Portland, Halifax, St. Albans, Rutland, the White Mountains, Burlington, or Montreal in the North, over the Suspension Bridge at Peekskill.

Narrow-Gauge.

WE clip from the Wilmington, Del., *Commercial*, the following portions of an article contributed by W. S. Auchincloss, Vice-President of the Delaware Car-Works of that city, a writer whose views on the narrow-gauge question are deserving of consideration. His high standing as an engineer and his practical familiarity with the construction of narrow-gauge rolling-stock render his opinions on this subject especially valuable. We have space only for the following extracts, the remaining portion of the article containing replies to special points suggested by a correspondent of the same paper :

"In the first place, I distinctly disavow any sympathy with those who look upon the narrow-gauge system as a perfect specific for all the ills that railway economy is heir to. I believe that the narrow-gauge system has a distinct sphere of its own, and that its interests are not, in themselves, calculated to clash with those of a judiciously constructed broad-gauge road, any more than does the one-horse carriage with the barouche and span. In viewing the system, therefore, as a whole, I do not expect to find a marked and decided economy in every one of its departments, but am convinced of its merits, if, while all of these show no increase of cost over the broad gauge, some of them exhibit an unquestioned advantage.

. . . . . .

"Six narrow-gauge passenger-cars (of the standard proportions in service throughout the United States) will carry 216 passengers, and they weigh 90,000 pounds. The same number of passengers are carried on the broad-gauge roads of the country in four cars that weigh 152,000 pounds, making a difference in favor of the narrow gauge of 62,000 pounds. Is it not clear that where so much dead-weight is dispensed with, the tractive power required will be smaller, much less fuel will be consumed in doing the same effective work, and that where the load is so distributed over the track, the ultimate effect on rails will be no more severe than on ordinary gauges? Economies of like importance obtain for freight-cars.

"I am asked whether a broad-gauge road, with a narrow-gauge equipment, would not have a decided advantage over a strictly narrow-gauge one, in being able to send cars over connecting broad-gauge roads. It seems to me that theoretically it would ; the idea of not breaking bulk is certainly an excellent one. But practically, it would be like turning out sheep to pasture among wolves. The light narrow-gauge cars, proportioned for their light trains, and engines of only 20 tons weight, would undoubtedly be badly crushed whenever broad-gauge engines of 58 tons' weight attempted to 'drill' them into line with such

ponderous trains as those same engines were capable of hauling.

"In this connection, I can not refrain from stating what I consider the true light in which to view the narrow-gauge question. Suppose, for instance, the case of two small cities, separated by say a distance of 50 miles, which it is desirable to connect by rail; also that the intervening country is but sparsely settled. The through traffic is but light, and two trains per diem will carry all of the passengers and merchandise seeking transportation. These may be handled in either of two ways. We may *concentrate* the entire mass in a few heavy cars, and draw them by means of a ponderous engine over 60-lb. rails; or, on the contrary, we may *attenuate* the mass by placing it in a number of light cars, and transport it by light engines over rails of only 30 lbs. to the yard. The trains in either case will not occupy more than three or four minutes in passing any given point, and during the remaining 1436 minutes of the day the capital invested in the rails and the road-bed will remain unemployed. From this stand-point, it would seem folly to invest a larger sum in the plant than was absolutely necessary to secure the safe and rapid transportation of the passengers and merchandise, and thus to save in the original cost of the construction, as well as in the annual drains made by the interest account. In course of time, the growth of the cities will compel the more frequent running of the trains, which will keep the capital more actively employed. The enhanced value of city property will render it more desirable for the road to concentrate its forces. Its resources will be more ample, and if it be expedient to widen the gauge and run in conjunction with other roads, it will be in a position to make the change and to gradually dispose of its rolling-stock to other companies which may be just struggling into existence. In other words, the more densely settled a country, the better able it will be to keep whatever capital it has invested in a railroad actively employed, the better able also to furnish the capital, and the greater the necessity for concentration in the transportation of merchandise and for forming connections with roads of the broad gauge.

"Like as one meets with extreme difficulty in attempting to draw a decisive boundary between the animal and the vegetable kingdoms, so also the relative advantages of the broad and the narrow gauge are interwoven on their boundary; but, having passed to either side of the neutral line, the advantages of both systems stand out in bold relief. I am aware that many feel sanguine of an ultimate triumph of the narrow over the broad gauge; but, for my part, I see no antagonism between the two systems. Each one seems to have its own appropriate field, and each is destined to work incalculable good to the human race."

Sleeping-Cars in Europe.

THE great success attending the establishment of sleeping-cars in the United States has stimulated our transatlantic neighbors to the establishment of similar systems in Europe. Several months since, a company was organized in Belgium for the purpose of extending over the different railway systems of Europe a service of sleeping-coaches. The high speed of the trains, and still more necessity of conforming to the railway usage in the European countries, have thus far caused the rejection of the long American sleeping-coach, and the adoption of carriages similar in their exterior dimensions to those in ordinary use on the European railways.

Two principal types of sleeping-cars have been adopted: one type of six wheels for the mixed trains of the first and second class, designed to circulate principally in Northern Germany; the other type of four wheels for coaches of the first class, intended for the railroads of Belgium, Austria, France, Bavaria, etc.

The car of the first class has an exterior form similar to that of ordinary European coaches, and is divided into four compartments. Two of these compartments are designed for four persons each, and the two other compartments are designed for two persons each, and are ordinarily reserved for ladies. The car contains a toilet cabinet, with a lavatory, reservoir for drinking-water, etc. The compartments are so arranged that the ladies can enter or leave the toilet cabinet without being seen by the other passengers. Between the chairs in the compartments are placed small tables, so arranged that they may be folded up against the wall of the carriage. During the day, the beds are secured near the roof of the carriage, in a manner similar to that with us. The operation of preparing the car for the night requires about ten minutes.

Instead of the usual manner of lighting cars, passengers who wish to read or to play are accommodated with small lamps fixed to the wall. The interior of each vehicle is in charge of an especial employee, who punches the tickets, prepares the beds, and in general looks to the comfort of the passengers. Any passenger having a first-class ticket is admitted to a place in one of these sleeping-cars, on the payment of from six to ten francs in addition to the regular fare.—*American Artisan.*

Estimated Cost of a Narrow-Gauge Road.

MESSRS. F. E. CANDA & CO., car-builders and railroad contractors, of Chicago, make the following estimates of the probable cost of a narrow-gauge road over a prairie country like that in the vicinity of that city. This firm are engaged in building the St. Louis and Cairo narrow-gauge road, and their experience in this undertaking gives them a basis of positive knowledge in regard to the various details which should render their estimates very reliable. It will be observed, however, that in giving the weight and capacity of freight-cars of the standard and three-foot gauges, the minimum capacity of the former is set against the maximum capacity and minimum weight of the latter. We give the figures as we find them, leaving our readers to form their own conclusions in regard to their accuracy:

COST PER MILE—THREE-FOOT GAUGE.

Grading	$2200
Iron (30 lbs. to the yard)	4080
Fish-plates, fastenings, etc.	435
Cross-ties (2,640)	800
Bridging and culverts	400
Track-laying and surfacing	400
Engineering	250
Right of way	300
Station-houses, water-stations, etc.	375
Sundries	280
	$9520

ROLLING STOCK.

For a road 100 miles in length, doing a coal traffic as well as a general freight and passenger business, the following would be a fair equipment:

8 freight locomotives	$8,000	$64,000
4 passenger locomotives	6,500	26,000
300 coal-cars	450	135,000
70 flat-cars	420	29,400
100 box-cars	520	52,000
10 passenger-cars	3,000	30,000
3 passenger-cars, 2d class	1,500	4,500
3 baggage-cars	1,400	4,200
		$345.100

Or $3451 per mile.

If a forty-pound rail were used, the cost would be about $1200 per mile more than the above estimate; but where the grades are not steep, or the traffic especially heavy, a thirty-pound rail is deemed quite sufficient. The ties, however, should be placed as near together as on wide-gauge roads. These estimates are made, of course, on the basis of actual cash cost and an honest expenditure. They allow no margin for Credit Mobilier contracts or other "ways that are dark" in railway construction.

Messrs. Canda & Co. also build all the cars for the above-named road at their shops in Chicago. Their factory is located at the intersection of Blue Island avenue and Robey street, where they have fifteen acres of ground with 1800 feet of river and dock frontage. They propose doing all kinds of car-work, but at present find all they can do on narrow-gauge cars alone. The shops will have a capacity for employing 500 men, and extensive additions are in contemplation, making the establishment the most complete one of its kind in the United States.

The cars manufactured at these shops have the same style of construction now in use in the most approved wide-gauge cars; the proportions, weight, etc., being diminished to correspond with the three-feet gauge. They are heavier than those used on other narrow-gauge roads; but some objections to the latter, on account of strength and stability, that were supposed to be incident to the narrow-gauge rolling stock, are thus entirely obviated.

The following tables show the details of these cars in comparison with the average standard gauge rolling stock:

PASSENGER-CARS.

Eight-wheel Passenger-Coach.	*Gauge, 4 ft. 8½ in.*	*Gauge, 3 ft.*
Length over all	43 ft.	40 ft.
Outside width	10 ft.	7 ft. 3 in.
Height in centre	9 ft. 6 in.	8 ft. 4 in.
Bottom of sill above rail	3 ft. 8 in.	2 ft. 7 in.
Top of rail to top of car	14 ft.	11 ft.
Diameter of wheels	36 in.	26 in.
Weight of wheels	500 lbs.	310 lbs.
Length of axle	6 ft. 9 in.	5 ft.
Number of seats	56	32
Weight of empty car	19 tons	7½ tons.
Weight when full	24½ tons	10 tons.

FREIGHT-CARS.

Box-Cars.	*Gauge, 4 ft. 8½ in.*	*Gauge, 3 ft.*
Length over all	30 ft.	24 ft.
Width	8 ft.	6 ft. 3 in.
Height of car in centre	8 ft.	7 ft. 4 in.
Bottom of sill above rail	3 ft. 6 in.	2 ft. 5 in.
Top of rail to top of car	11 ft. 3 in.	10 ft.
Diameter of wheels	33 in.	26 in.
Draw-head above rail	30 in.	25 in.
Weight of empty car	10 tons.	5 tons.
Capacity	10 tons.	10 tons.
Platform-Cars.		
Height of sill	3 ft. 3 in.	2 ft. 2 in.
Weight of car	9 tons.	4½ tons.
Capacity	10 tons.	10 tons.

The above figures on weight and capacity of narrow-gauge freight-cars may appear somewhat surprising, but their correctness has been proven by actual use on the Cairo and St. Louis road. The less weight and strength of parts required in the narrow-gauge freight-car, to sustain a given load, is attributable to three facts: a diminished overhanging at the sides, less area over which the load is distributed, and the greater proportion of it carried within the bearing-points. Of course this would not apply in the case of bulky freight, where the full load can not be placed on the three-foot car; but in the shipment of coal, iron ore, corn, etc., all this advantage is available in favor of the narrow-gauge road.

Light Locomotives.

THE Chicago *Railway Review* contains the following notice of the works of Messrs. Porter, Bell & Co., manufacturers of light locomotives at Pittsburg, Pa.:

"Their specialties are, along with narrow-gauge locomotives proper for general railway use, light locomotives of all kinds for use on coal and mineral roads and in mines. An admirable system prevails throughout the works. All parts are made to templets, and are interchangeable—an improvement in locomotive manufacture of so recent date that the establishment could begin with it after it had been brought to perfection. All holes, for instance, are drilled through a steel-hardened thimble, insuring perfect accuracy. The use of steel is very large, all

joints in the valve-motion, all links and guides, the tires, and the boilers and fire-boxes largely, being of steel. An intelligent study has been made of the new problem of narrow-gauge operating economy, with the result of convincing the managers that, first of all, the engine that can pull the most weight is to have the inside track. Hence, the utmost weight possible is to be put on the drivers, and, in this view, the absence of the truck is not objectionable for slow speed, and especially on roads with heavy gradients. The maximum of motive power has been sought for, with the result of increasing the heating surface fully ten per cent over that of the engines built two years ago.

"In both specialties of mining engines and narrow gauge for ordinary roads, this company has attained notable results. Especially interesting is a class of three-foot-gauge engines, of which one has just been completed for the Susquehanna Coal Company, and two for the Sutro tunnel. These are emphatically *multum in parvo*. They can be built down to 5 feet in height and 49 inches in width over all. They have four drivers with 48-inch wheel-base. Their dimensions are: cylinder, 9 x 12; 28-inch drivers, inside connected, constructed with shifting-link; main rod, 48 inches, (instead of 33 as formerly,) giving a better balanced engine; weight, loaded, 6½ tons. This engine is a marvel of compactness, adapting it to use in close quarters, the outside width being but a few inches greater than that of the track.

"There are building at the works four engines for the Colorado Central narrow gauge: cylinder, 12 x 15; 33-inch drivers. The peculiarity of these engines is that they are truck-engines, fitted with trucks and coal-bunkers on three pairs of drivers, with an 8-feet wheel-base. Their weight will be about 18 tons. The same class of engines are built with tender, in case the weight of the fuel and water on the engine should be too great for the rail, reducing the weight to about 14 tons. On some roads the maximum weight can not be more than 2½ tons per wheel. These works are also building four engines for the Cairo and St. Louis road."

Westinghouse Brake on Driving-Wheels.

COMMENTING on an accident in which the locomotive broke loose from the cars after the brakes were put on, the Pittsburg *Commercial* says,

"The great importance of applying the brakes to drivers as well as to the cars has been forcibly demonstrated in the Mifflin accident. In a train of several cars, each car has its proportion of the weight of the locomotive to overcome. This weight is (independent of the tender, which has its own brake) about thirty-five tons, making a weight of about six tons to be overcome by each car, besides its own weight. This strain is not equally exerted between each car, but is, of course, the full amount between the locomotive and tender, and six tons less to the coupling of the next car, and so on.

"If there was a sudden jerk, it could not have been given by the brake, or by reversing the engine. In either of these cases, the train would be closed instead of stretched apart.

"There are instances on record of cases where the reverse lever of the locomotive has slipped forward, of its own motion, after having been reversed, and would make a tremendous jerk, sufficient to break any coupling. The fact of this immense strain being applied to the couplings would at first seem to have caused them to break, but it is well known that the strength of the couplings is sufficient to stand several times the amount of strain that would result from the application of the brakes.

"If the engine had been reversed, the strain would have been almost nothing upon the various couplings, as the locomotive would have taken care of fully one half of its own weight. If the air-brakes were applied to the driving-wheels of the locomotives, as well as to the other wheels in a train, there would be no strain upon any of the couplings, while the efficiency of the brake would be increased to a great extent.

"The Pennsylvania Railroad has applied the air-brake to the drivers of several of their shifting engines, and it is found to be at least twice as efficient in stopping trains as engines are when reversed.

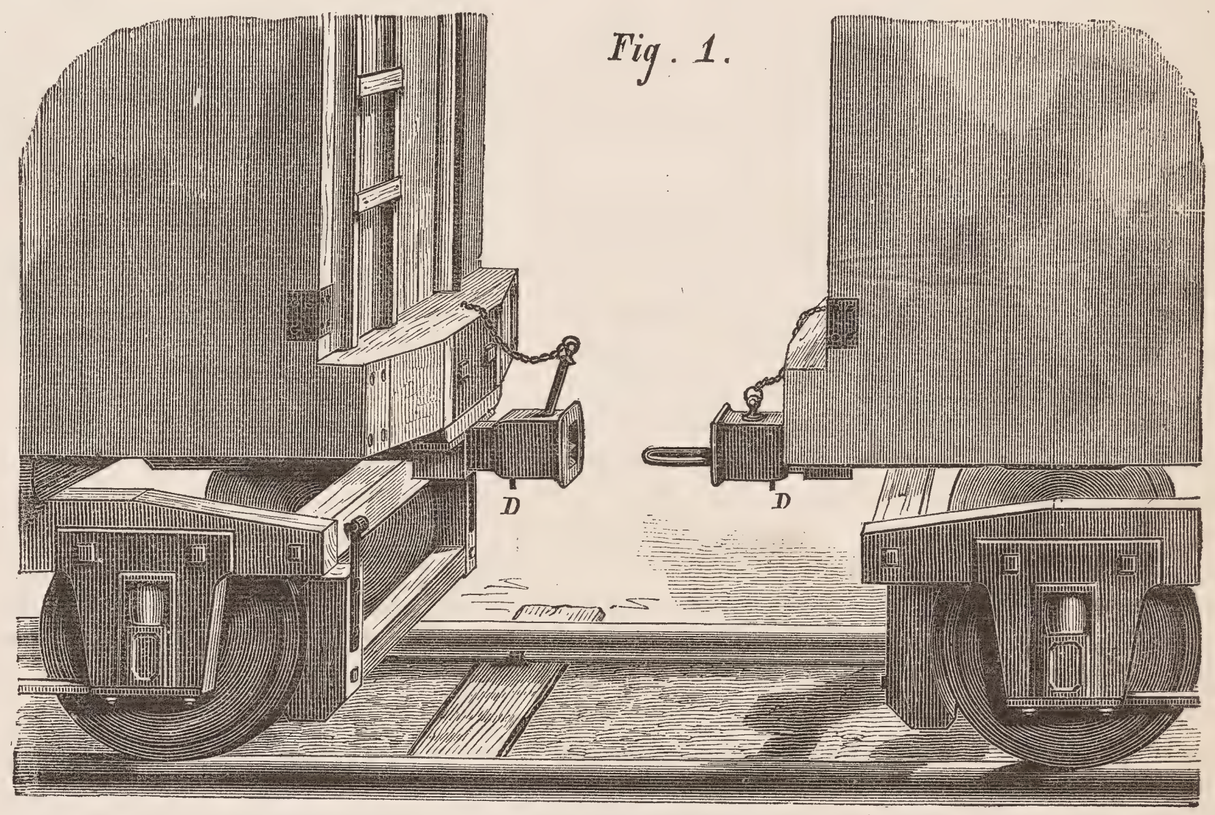
"It seems common sense would suggest that efficient brakes should be put on the locomotive, and thus prevent all strains on car-couplings, as well as provide against the locomotive breaking loose and running into the train ahead.

"In the Mifflin case, after the couplings were broken, the engine would lose part of the help of the cars, and so would apparently shoot forward and run into the train ahead; but in reality the train, after being relieved of the weight of the engine, would stop sooner than it otherwise would have done."

Automatic Car-Coupling.

OF the numerous devices for the automatic coupling of cars, a large proportion are objectionable on account of their multiplicity of parts, causing unavoidable expense in construction and difficulty in operation under unfavorable circumstances—so much so as to neutralize to a great extent the advantages of the invention. The apparatus herewith illustrated is the least complicated arrangement of its kind that has come under our notice, and, from an inspection of the working model, we are inclined to consider the claims of its inventor, as to its effectiveness, well founded.

Fig. 1.



NORTHROP'S AUTOMATIC CAR-COUPLING.

In general appearance it is very similar to the device in ordinary use. The mode of connection is the common link, either straight or, if adapted for cars of different heights, goose-necked, and a simple pin. Fig. 1 shows the device attached to two freight-cars, and in Fig. 2 it is represented in section. The bumper may be divided into any suitable number of compartments. In the present case it is divided into two by the partition A. At the rear of the hole, in this partition, through which the coupling-pin passes, is formed a recess B, in which the end of the pin rests, as shown, and is thereby supported while the cars are being run together. C is a bent lever pivoted within the bumper at the rear of the partition A. When the end of the coupling-pin is placed in the recess B, it pushes the upper arm of this lever back, swinging the lower arm forward. As the cars meet, the link enters the bottom compartment of the bumper, strikes against the lower arm of the lever, pushing it back, thereby causing the upper arm to move forward, strike against the pin, and push it out of the recess. The pin then naturally drops into its slot and through the link.

Fig. 1 is more especially designed to show the position of the device just before coupling, and also to indicate that the invention, with the exception of the downward projecting ends of the levers D D, occupies no more space and, indeed, is hardly distinguishable from the old-fashioned coupling. To uncouple freight-cars, a chain may be carried from the pin to the roof, by which the pin can be easily withdrawn. One of the principal advantages of the apparatus, other than those already stated, is the facility with which it may be gradually introduced on a road, as new cars supplied with it can be readily attached to old cars on which the common coupling is used.

Patented through the *Scientific American* Patent Agency, June 11th, 1872. Further information may be obtained by addressing the inventor, Mr. Samuel G. Northrop, Wilmington, N. C

Testing Lubricating Oils.

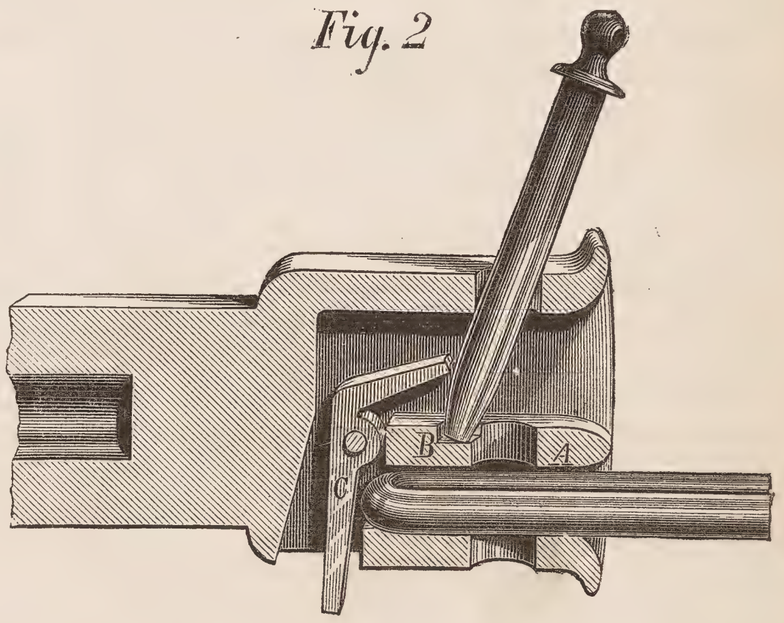
A MACHINE, recently patented by R. H. Thurston, Hoboken, N. J., affords the means of making a combined dynamometrical and thermometrical test of the lubricating value of any lubricant, and also of determining, at the same time, its power of sustaining heavy pressures and its durability under any required pressure.

A journal, on a shaft running in a securely mounted frame, is grasped by a clamp, and the boxes are set up to any desired intensity of pressure by a powerful screw compressing a spring; the pressure is known from the reading of a suitably arranged scale.

The pressure being adjusted as desired, the clamp swings about the journal, and, by compressing a spring or by raising a weight, determines the exact amount of force required to overcome friction, by the reading of another scale.

A thermometer, set in the journal-brass, indicates

Fig. 2



the commencement and progress of any heating of the journal. The time required to become heated and to burn off, under a given pressure, will indicate the durability of the oil where it may be exposed to such a pressure.

Several forms of machine are described for special classes of lubricants, as for heavy oils for locomotives, at the one extreme, and for the light oils used on sewing-machines and other light machinery, at the other extreme.—*Scientific American.*

The Ohio Falls Car-Works.

THE new buildings which constitute these works are all of brick, with brick cornices and galvanized iron gutters. The roofs are of Welsh slate, and the doors plated with sheet-iron. There is no fire exposure outside, except the window-frames. The lighting is mainly by means of sky-lights, consisting of heavy, rough plate-glass, half an inch thick, and so arranged as to expose no wood-work on top. Gas from the city mains is used for artificial lighting. The buildings are all one story high, and whenever wooden floors are used, they rest directly on gravel, so that fire can not spread underneath. Direct and exhaust steam is used for all heating purposes. A space of twenty-five feet intervenes between the buildings in the wood department, and at the points of greatest exposure, there are no window openings in the walls. In the buildings of the iron department, there is not sufficient inflammable material in any one of them to communicate fire to an adjoining one. The passenger department is completely detached from all other shops. All the shops are considered to be as nearly fire-proof as is practicable; so much so, at least, that any fire can be confined within the walls where it originates. The most ample provision for such an emergency has been made in the way of steam fire-engines, hydrants, hose, reservoirs, steam-pumps, etc.

The new machinery is of the best description, and the facilities for handling material and working it in the quickest and most economical manner are such as to cause a considerable reduction of expense as compared with what it formerly was. There is room in the present buildings for additional machinery, in case of need. The capacity of the works is equal to the turning out of two and a half million dollars' worth of work per annum.

Railway Engine-Men.

WE are sure that our sympathetic readers, and professional railway men especially, will recognize the truth of an appreciative essayist who says,

"I would like to offer my tribute of praise to a class of railway men who are not appreciated as they should be, namely, railway engineers and their assistants—men who take their lives in their hands and lead the advance, in fair weather and foul, in the brightest days and darkest nights, always at their post, with eyes on the track and one hand on the lever and bell rope. We often hear of the 'gentlemanly conductor,' but how little do the public hear or know of the hero at the other end of the train, to whose care the lives of the passengers and the safety of the train are committed?"

There is much, too much, force in the remark. Upon the man "at the throttle"—upon his steady nerves, fidelity, courage, and good judgment, more than upon any other one, or perhaps all of the operatives upon a train—depends the safety of passengers whose very lives may truthfully be said to be in his hands. His isolated position, so far removed from passengers, naturally secludes him from their notice, even if his soiled, begreased habiliments do not preclude much companionship, even with those who recognize and admire his worth, while the "gentlemanly conductor" is almost constantly in sight and communication with his "guests." So it happens that the most responsible operative of a train receives so few compliments from peripatetic scribblers and so little notice generally. Again, too, the position of engine-man is not in the line of promotion, or very rarely so. Other employees sometimes rise from the lower to the highest positions in the employ of their companies; but the enginemen generally remain such as long as their physical endurance holds out—which on an average is but a few years. The post is a hard one, constantly requiring a great strain upon the constitution, and consequently they, as a class, are short-lived.

Recognizing the disadvantages of their laborious life, many companies have adopted means to make it more agreeable, by supplying comfortable and even luxurious quarters, with lodging-rooms, a well-supplied refreshment-table, library of books and periodicals, etc., for their use while off duty, so that they may snatch a few hours of ease now and then. By the men, while away from their homes—as of course they are obliged to be much of the time—such thoughtful provisions are fully appreciated, to judge from their emphatic expressions of satisfaction. Measures of this sort can not be too liberally adopted by our railways, in pursuing their own interest as well as for the elevation and improvement of this class of their employees, giving them as far as possible pleasant surroundings, and treating them with the consideration and respect due to their responsible avocation.—*Railway Review.*

Black-Walnut Finishing.

WE copy from the *Cabinet-Maker*, the following remarks on this subject which may prove interesting to car-builders:

"It should be premised that the walnut work of the day bears upon its surface, to a greater or less extent, raised panels covered with French burl veneer. And upon this fact depends the beauty of the production to a very great extent. And the effort is, to so finish the article that there shall be a contrast between the panel and the ground-work on which it is placed. In other words, the former should be of a light color, while the latter is of a darker shade. In that view, the palest shellac should be used on the panels, and darker pieces, liver colored, etc., on the body of the work. The darker grades of shellac are the cheaper, and will answer for the bulk of the work, but the clearest only for the panels.

"In commencing to finish a job direct from the cabinet-maker's hand, rough, and innocent of any knowledge of sandpaper, the panels should first be covered with a coat of shellac to prevent the oil in the filling from coloring them dark. Next, cover the body of the work with a wood-filling composed of whiting and plaster of Paris, mixed up with japan, benzine, and raw linseed-oil or the lubricating oil made from petroleum; the whole colored with umber, to which, in rare cases, if a reddish shade is wanted, venetian red is also added. This filling is then rubbed off with cloths, and by this process tends to close up the grain of the wood and produce an even surface. More or less time should be allowed after each of the several steps in the finishing process for the work to dry and harden, though much less is required in working with shellac than with varnishes composed of turpentine, oil, and gums. But the time allowed is often hurried up by the desire to get the work through as soon as possible, so that no standard can be set up as to the number of hours required between each of the several processes. It would be well if twelve hours intervened, but if work must be hurried through in three days, which ten could well be devoted to, obviously the processes must follow each other in a corresponding haste.

"A coating of shellac is then given the whole work, light on the panels and dark on the body-work, and when it has dried and hardened, which it does very soon, it may be rubbed down. This process of 'rubbing down' should be done evenly and carefully, so as not to rub through the shellac at any point, and is done with the finer grades of sandpaper, for the cheaper class of work, particularly at first; but at a later period of the process, and for the better class of articles in all cases, hair cloth should be used, the material for the 'rubbing down' being pumice-stone, moistened with raw linseed oil for the best work, and the lubricating oil before mentioned for cheaper work or the covered parts of the better grades. This rubbing down involves labor, wear of fingers and finger-nails, and is carried on with an ordinary bit of hair-cloth, the smooth surface next the wood, and not made in any particular shape, such as a wad, or ball, or otherwise. In the corners and crevices where the hair-cloth will not enter, it will be necessary to use sandpaper; the finest grades, and worn pieces only.

"Three coats of shellac are put on, followed each time by this 'rubbing down' process, each one giving the work a smoother feeling and a more perfect appearance. Afterward, to complete the whole, a coating of japan, thinned with benzine, is applied, which gives a clean appearance to the work, and the dead glossy finish.

"There is this objection to the above style of finish, that the japan catches all the dust which touches it, and holds it permanently, so that many of the best workmen will not have work finished in this way for their own private houses, preferring the brighter look made by shellac and varnish without rubbing down the last coat, and saying that the work can be kept much cleaner."

The Future Supply of Fuel.

PROFESSOR P. W. SHEAFER, of Pottsville, Pa., in a recent address to the students of Lafayette College, at Easton, refers to this subject as follows:

"But though Pennsylvania's store of anthracite will last for many years, and long after it is drawn upon to supply England, it is useless to deny that there is a limit to the supply, and that after a time it will be exhausted.

"We shall proceed to open the grand reservoir, the bituminous coal-fields, compared to which our anthracite beds are but as a mill-pond to the Gulf of Mexico. With a bituminous area of 12,000 square miles in Pennsylvania, and 197,000 in the United States, we can supply the world with fuel for ages to come.

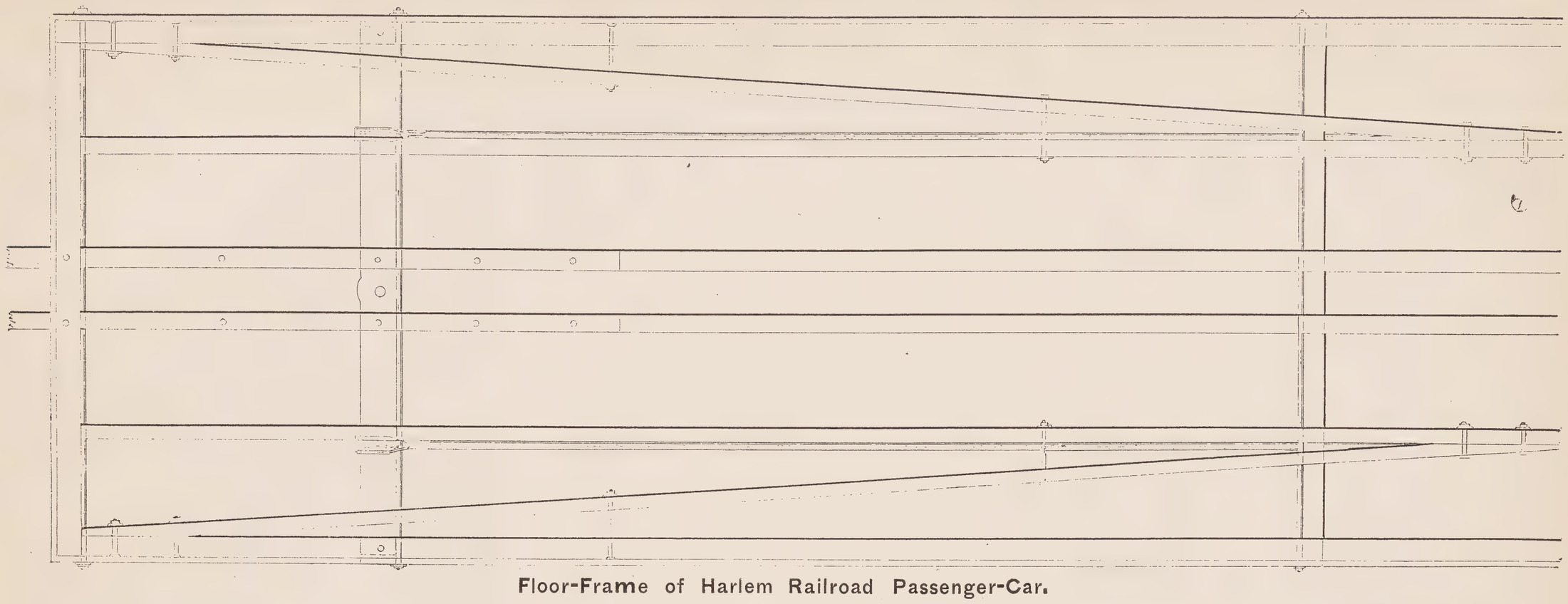
"And after the bituminous, what? Brown coal—lignite—that queer, woody-looking mineral, little known as yet, but already beginning to be used, and destined to play an important part in the world's great drama, long ages hence. With this, as with the other coals, America is still the favored land. It is found from Behring's Straits to Salt Lake City, and again, in Tehuantepec, Panama, Peru, and from Chili to Patagonia. But it also occurs in many other parts of the earth. It stretches in almost a continuous belt across half the world, from France to China. It is found in Australia, Van Diemen's Land, Sumatra, Borneo, and probably in many other countries where the bowels of the earth have not yet been explored.

"So we shall not lack for fuel very soon. The main point, however, is that Pennsylvania holds the key to these vast store-houses of fuel, and consequently to the work-shops of the world. Her supreme command of the world's supply of anthracite, and her rich deposits of iron, give her a prestige which she will never lose."

Narrow-Gauge Railways.

A GOOD deal has been said and written in regard to the narrow-gauge railroads, but the latest invention in that line has lately come to light in England. Mr. Fell, a Mont Cenis engineer, has put a narrow-gauge line of only eight inches in width in successful operation as a conveyer of the heavy traffic of iron mines to a railway. After this accomplishment, the government engaged him to construct a line at Aldershott for military purposes. The gauge there is eighteen inches wide. The width of the line is ten feet, and the whole rests on posts. The road is a perfect success, and a speed of twenty miles an hour was attained, thirty miles being the maximum attainable. The London *News* says the success of this little road will gradually lead to the introduction of the same means of communication at other military stations, to say nothing of the possible use of similar means of transit should England be again involved in war. The cost of a road like this, of eighteen-inch grade, is from $7500 to $10,000 a mile. Such roads must yet come into use in the mining regions, and up and down the contracted valleys of streams.

MR. F. J. LAWRENCE has an extensive car head-lining factory in Albany. He employs skillful artists and turns out excellent work, specimens of which may be seen on many important roads, and especially on the New-York Central and Hudson River cars.

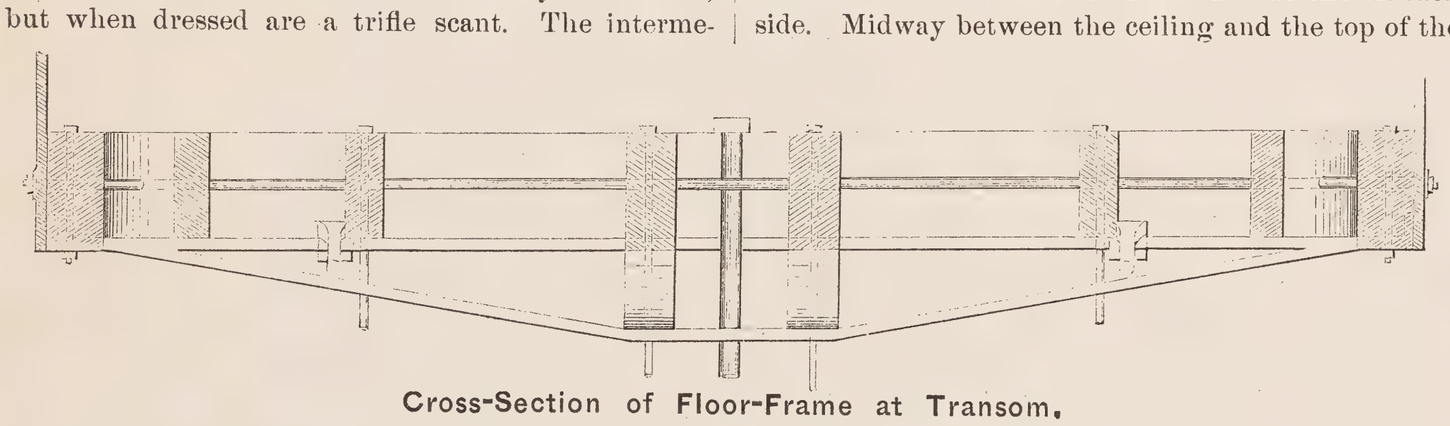


Floor-Frame of Harlem Railroad Passenger-Car.

The Floor-Framing of Cars.

THE above cut is a half-length plan illustrating the method of floor-framing employed by Mr. Garey, the master car-builder of the Harlem Railroad. This method combines great strength and stiffness, and is equally well adapted to much larger cars than those of the medium length. The timber used for the entire frame, excepting the end-sills, is the best selected Southern pine. The end-sills are oak, $8\frac{3}{4}$ x $5\frac{3}{4}$, and the side-sills 5 x 9 as they are sawed, but when dressed are a trifle scant. The intermediates next the side-sills are 3 x 8, and the two central ones, which are subjected more directly to the strain of drawing and buffing, are 4 x 9. The transoms are iron, constructed as shown in the cross-sectional drawing, the plates being seven inches wide and one inch thick. The truss-rods, as will be seen from the diagram, start from the transom, and do not, as is too often the case, run up over a block on the transom, and forward to the under side of the end-sills. This latter method would appear, on a superficial view, to be the best one; but a more careful examination shows that its apparent advantages are based upon the idea or theory that the ends of the car outside the transoms are equal in weight to the central portion between them. This, however, is not the case, and consequently this method of trussing furnishes no adequate support to the middle of the car. In the framing which we illustrate, the ends are sustained by means independent of those employed to hold up the centre. The transom is notched into the sills and draw-beams, the latter being made fast to the two central intermediates by six $\frac{3}{4}$-inch bolts. The transom is strongly bolted to each of the sills. The draw-beams, or bumper-arms, as they are sometimes called, extend $3\frac{1}{2}$ feet back of the transoms, and are also prolonged to the front of the platform, so as to make it virtually a part of the floor-framing.

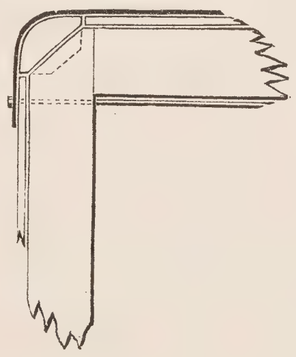
The diagonal timbers, as shown in the plan, reaching from the corners to the central part of the first intermediates, are designed to take up and distribute the shocks and strains to which the corners are subjected. These diagonals are bolted to the side-sills, and, by means of blocks or wedges driven in between, they take a long bearing on the sills. The same blocks and bolts are used where the diagonals meet at the centre of the car, at which point a line of blocking extends clear across the frame, and all is held fast by a $\frac{3}{4}$-inch bolt reaching from side to side. Were only an ordinary double floor laid upon this, the whole would form an unusually strong frame without any additional aid. Such, however, is not the method adopted by Mr. Garey. He puts on the under side a ceiling of $\frac{3}{4}$-inch hard pine, running lengthwise and forming three panels—a narrow one between the two central sills and a wide one on each side. Midway between the ceiling and the top of the



Cross-Section of Floor-Frame at Transom.

sills is an intermediate flooring of $\frac{1}{2}$-inch waste-stuff put in crosswise and held in place by furring. This middle flooring being firmly driven in between the sills and diagonal braces, prevents the braces from springing or yielding under the force of a blow, and it also deadens noise and makes the car warmer by dividing the space between the ceiling and upper floor into two air-chambers. On the top of the frame is placed a diagonal floor $\frac{5}{8}$ thick, and upon this the upper one of 1-inch yellow pine tongued and grooved, and running lengthwise the car. This double flooring extends to the outer edge of the side-sills, the truss-plank resting directly on them.

The accompanying cut illustrates the method of finishing the corners. The end of the sill is cut off at an angle of forty-five degrees, so that the corner post can come down over the end—the post at the same time, projecting far enough to be flush with the paneling alongside ofit. Outside of all is an iron strap, through the outer end of which passes a $\frac{3}{4}$-inch rod which runs across the car just inside the end-sills. This strap is 7 inches wide and $\frac{1}{4}$ thick, and, in addition to the rod, is screwed on with No. 16 wood-screws, making a strong corner and one easily repaired in case of injury.



The iron transom to which we have referred is growing in favor among car-builders. It is always in place, and is not liable, like wooden ones, to warp and twist. The extent to which a wooden transom will bulge or twist is not always fully known, as it frequently takes the sills with it, and its distortion is only seen in the general getting out of shape of the car end. In examining, not long since, the iron cars upon the Hudson River road, our attention was called to the wooden transoms with which they were built. The floor-beams having kept in shape by their own strength, showed very plainly the warping and twisting of the transoms, which, as a rule, touched nowhere except on the centre-plate. Had the cars been wooden ones, the distortion would hardly have been noticed, because the end-timbers would have been warped to correspond with the transoms.

In connection with the foregoing, it may be mentioned that Mr. Jones, the master car-builder of the West-Albany shops of the New-York Central road, puts in diagonal braces of single sticks sprung outward from the middle sills. They are placed thus to enable the side-sills and truss-planks to receive a portion of the drawing and buffing strains. In other respects, the framing of the cars built at these shops is similar to that we have described.

The recent accident on the Hudson River road, near Yonkers, caused by the collision of a runaway engine with the rear of a train, very clearly demonstrates the strength of these trussed platforms with the six sills in the frame and diagonal bracing. Although the engine struck the train with great force, it penetrated only as far as the iron transom, or about six feet. A similar accident occurred on another road not long since, when cars less strongly built were struck by an engine, the rear one being completely demolished, while those in front were rendered worthless or nearly so by telescoping.

Mica Head-Lights.

THE introduction of silvered mica reflectors into locomotive head-lights has proved a complete success. In addition to the testimonials furnished by the engineers of two locomotives on the West-Jersey Railroad, published by us some time since, in which one of them asserted that he could by their aid distinguish the features of a person at a distance of four hundred yards, we have now to state that they are being tested on the Reading, North-Pennsylvania, and other railways, with the most encouraging prospects as to their adoption on account of their economy, durability, efficiency, and saving of labor. We have just been informed that one of these reflectors happened to be on the locomotive on the North-Pennsylvania Railroad that exploded a few days ago, and that notwithstanding the fact that the smoke-stack fell heavily on the lantern, completely demolishing and bending the reflector almost double, when relieved of the pressure, it sprung back to its shape, and, with the exception of the displacement of one or two small pieces of the silvered mica, it was uninjured; whereas, had it been a metal reflector, it would have required replating and bending, involving an expense of at least twenty dollars.—*Trade Journal.*

Car-Shop Notes.

THE BARNEY & SMITH MANUFACTURING COMPANY, DAYTON, OHIO.

THIS company has for many years been extensively engaged in the building of passenger and freight-cars, and also in the manufacture of car-wheels. Their business has grown with the extension of railways and the increasing demand for rolling-stock, until the works now give employment to a force of about 800 men. Within the past year, a number of substantial brick buildings, some of them two and three stories high, have been erected in place of the former wooden ones. They all stand detached from each other in order to guard against the spread of fire, the only connection being by iron bridges. Each floor is provided with a fire-plug with hose attached, and a supply of water sufficient for any ordinary emergency. About forty tons of pig and ten tons of bar-iron are used every day in the car departments. A heavy stock of lumber, averaging not less than six million feet, is kept constantly on hand.

The company have at present some large contracts in hand for freight-work. They are also building 18 Pullman sleeping-coaches, and have the option of closing a contract for 25 additional ones. The style of these coaches is in accordance with the Pullman plan "No. 47," the leading features of which are a smoking-room at one end, with no communication with the central portion, except by going out upon the platform and passing in by another door; a gentlemen's wash-room at the opposite end; ten central sections, and a ladies' dressing and state-room. The interior finishing is in black-walnut, with raised panels of French walnut. The berth-panels are inlaid, and are beautiful specimens of this branch of cabinet-work, contrasting very effectively with a border of imitation ebony, made of hard maple, stained entirely through, and taking a polish so as to resemble the genuine ebony very closely. Baker heaters and Carroll ventilators are used; also supply-ventilators similar to those in use on the Pennsylvania road. These cars are to be ready for delivery by the first of September next.

In addition to the above, the company are building, and have nearly completed, six passenger day-coaches for the Indiana and Illinois Central Railroad, which are the most beautiful cars of their class we have seen. They are 48 feet long, have four-wheel trucks, and in their general appearance, both inside and out, very closely resemble the Pullman style of coaches. The panel spaces between the windows are occupied with French plate mirrors, with frames handsomely carved, and relieved with fine-line gilding. There are mirrors also at each end against the saloons. The saloon corners are rounded and highly polished, and in two of the cars are made of Florida cedar, which is very fragrant. The frames of the window-blinds are paneled and chased in gilt with figure designs, *à la* Japanese. The seats are upholstered with scarlet plush, and have nickel-plated arms. The head-linings are in the Pullman style, and the deck-lights of embossed glass. Baker heaters are used, with pipes running under the seats. The company are also building, for the same road, three combined postal and smoking-cars. The smoking department of each is provided with twenty black-walnut revolving chairs with cane seats and backs. The inside work is solid ash and black-walnut, set off with Pullman head-linings. Smokers, with their cigar-cases replenished with the best imported brands, will find these vehicles as well suited to their wants as any that have yet been devised.

The company is also building a car designed for the special use of Messrs. Phillips & Colby, contractors for the construction of the Wisconsin Central Railroad. This car is 56 feet long, runs on six-wheel trucks, and is equipped with the Miller platform. The outside finishing is plain; the inside is in black-walnut, paneled with Hungarian ash, with gilt chasing. There is a large central compartment, containing four ordinary sleeping-sections, with upper and lower berths. A smoking-room occupies one end of the car, and a sumptuously furnished parlor the other end, both ends having large plate-glass windows which afford a good view of the track. There is also a private state-room with a sofa-bedstead and two easy-chairs. The car is also provided with a kitchen containing a sink, refrigerator, cold and hot water tank, and a range covered on its four sides and bottom with non-conducting cement an inch thick, and an iron casing outside of this.

THE MANSFIELD MACHINE-WORKS.

These works are situated at the intersection of the Atlantic and Great Western, and Pittsburg, Fort Wayne, and Chicago Railway tracks, at Mansfield, Ohio. They were originally designed for the manufacture of agricultural machines, but, after passing into the hands of the present proprietors, were changed into a car-factory. Their location is a very favorable one for this purpose, as lumber can be easily procured from the great sources of supply, North and South, and iron and coal are also equally accessible. Railway facilities, including the broad gauge of the Atlantic and Great Western, and the standard gauges of various other roads, are also abundant for receiving material and shipping cars. The main building is of brick, three stories high, and in the form of an L, the wings being respectively 80 × 150 and 80 × 100, the larger one constituting the wood-working department, and the other being devoted to iron machinery. A large hoist-way communicates with the upper floors, where some of the lighter wood-machinery is located. Among other machinery on the lower floor, is a planer with bed to take a sixty-foot stick; also a universal wood-worker, and a universal shaping and tenoning machine. The latter was invented by Mr. E. H. Rees, the superintendent of the works. It has a fixed bed, the cutter-heads being movable and so arranged that they can be raised above or lowered beneath the bed-plate without affecting the tension of the belt. This obviates the necessity of turning the stick, which is held stationary and can be cut with more precision. In the iron machine department are three axle-lathes capable of turning forty axles a day; a Bement wheel-borer which can bore sixty wheels a day; a hundred and fifty ton wheel-press, bolt-cutters, bolt-making machines, etc. The foundry and blacksmith-shop are also built of brick. In the former are made all kinds of car-castings except wheels. The setting-up shop is a frame building 80 × 150, with room for ten cars at a time. The paint-shop is also a frame building, and is 300 feet in length.

All kinds of freight-cars are built at these works, the number turned out last year being upward of 800, which are now running on various Western roads. A short distance from the car-works is a building devoted to the manufacture of steam-engines and general machinery. Mr. Rees, the superintendent, is also the inventor of a compound engine with one cylinder, many of which have been made and sold within the past year. His universal shaping and tenoning machine is also manufactured here, and is in use in several car-shops, doing excellent work and saving the labor of five or six men.

THE ATLANTIC CAR COMPANY.

The works of this company are located in the city of Salem, Mass., on the corner of Broadway and Ocean avenue, and adjoining the track of the Eastern Railroad. The company was organized about a year ago, with a capital of $100,000, which has since been increased to $150,000. The officers are N. C. Robbins, President; A. S. Rogers, Treasurer and Agent; and S. W. Remer, Superintendent. Active operations were commenced in October last. The works cover an area of about four acres, and were planned and constructed under the immediate supervision of Mr. Remer, who has had much practical experience in car-construction.

The paint-shop is 220 × 76, contains 12 tracks, and is well ventilated and lighted. Between this and the setting-up or erecting shop, is the transfer-table pit, three feet deep and 234 feet long, with two tracks. The table is of the usual size for one passenger or two freight cars. A space of ten feet intervenes between the transfer-table pit and the shops on either side. The erecting-shop is 116 × 76, and has six tracks. This building is designed more especially for passenger-cars, and has the upholstery rooms on its second floor. A freight-car erecting-shop, 120 × 76, will shortly be constructed south of the last-named shop, and communicating with the transfer-table track. The blacksmith-shop is 40 × 78, has 12 fires, and is furnished with steam-hammers and all the most improved machinery for heavy and rapid forging. The machine-shop is a two-story building, 125 × 60, equipped with the best and most approved machinery for wood-cutting and other purposes. The upper story is devoted to cabinet-work. Chips and shavings are conveyed from these departments to the boiler-room by means of spouts. The power is supplied by a Corliss engine rated at 50 horse-power, and 2 boilers of 30 horse-power each, all built by William A. Harris, of Providence, R. I. The engine-room is 55 × 25, with a drying-room overhead capable of holding 40,000 feet of lumber.

The relative position of the several shops and the numerous fixtures incidental thereto, can not be understood without the aid of a diagram. It is sufficient to say that every thing is arranged in the best manner, and with a view to the turning out of work with economy and dispatch. The entire works are heated by steam and lighted with gas. Lumber and other material, offices, etc., are all included in the area above mentioned, the whole being surrounded by a high picket-fence.

The works employ 140 men and are now building four elegant cars for the Eastern Railroad. They are made in the most thorough manner, finished in mahogany, rosewood, French walnut, and other ornamental woods, and ornamented with carving and gilding. The Miller platform and Westinghouse brake are used on each car. They will cost about $6000 each. The company are also building six others for the New-York Central Railroad, and have a contract for nine more passenger-cars for the same road, ten for the Boston and Maine, and one hundred freight-cars for the latter corporation, all to be done by July next.

How to Use a Wheelbarrow.

IF you have occasion to use a wheelbarrow, leave it, when you are through with it, in front of the house with the handles toward the door. A wheelbarrow is the most complicated thing to fall over on the face of the earth. A man will fall over one when he would never think of falling over any thing else. He never knows when he has got through falling over it either; for it will tangle his legs and his arms, turn over with him and rear up in front of him, and just as he pauses in his profanity to congratulate himself, it takes a new turn and scoops more skin off him, and he commences to evolute anew, and bump himself on fresh places. A man never ceases to fall over a wheelbarrow until it turns completely on its back, or brings up against something it can not upset. It is the most inoffensive-looking object there is; but it is more dangerous than a locomotive, and no man is secure with one unless he has a tight hold of its handles, and is sitting down on something. A wheelbarrow has its uses, without doubt, but in its leisure moments it is the great blighting curse on true dignity.

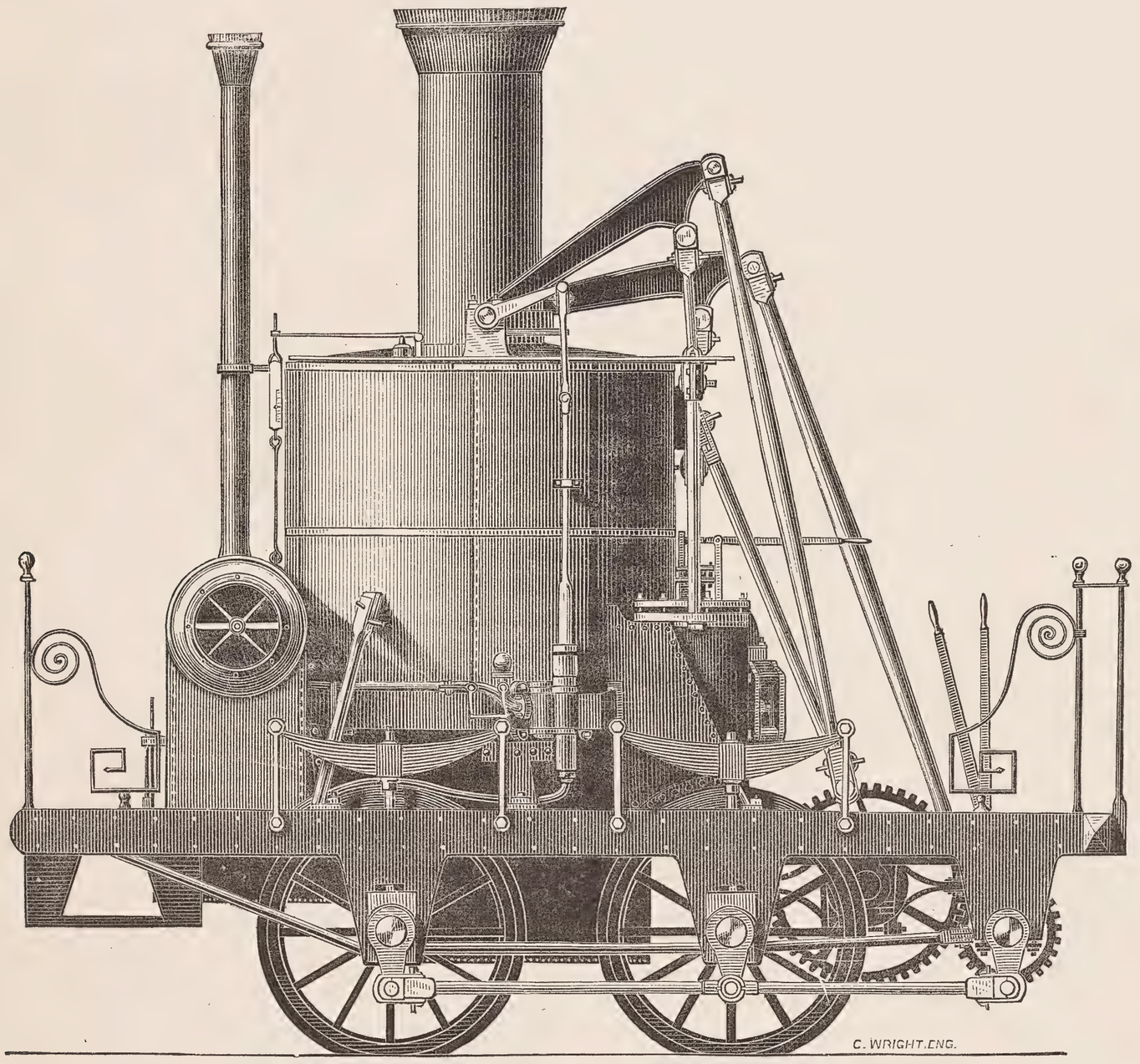
TRACK-LAYING on the St. Louis and Cairo narrow-gauge road is progressing at the rate of about a mile a day. Box-cars are now running from the east side of the Mississippi, opposite South St. Louis, to Red Bud, a distance of thirty-five miles.

THE last pier of the St. Joseph bridge, over the Missouri, was landed on the bed-rock on the 3d of March. The bridge will be completed within seventy days.

The Baltimore and Ohio "Grasshopper" Engine.

We are indebted to the *Railroad Gazette* for the accompanying cut which represents one of the original "grasshopper" locomotive engines built by Phineas Davis, at the Mount Clare depot of the Baltimore and Ohio Railroad, prior to the year 1835. Twelve of these engines were built for the road, some of which are still in use at the Mount Clare shops. The engraving is copied from an original lithograph published by Gillingham & Winans, who leased the company's shops and continued to build engines of this class after the death of Mr. Davis, which occurred in the year above named. The lithograph bears the following inscription:

"The characteristics of this engine are: 1. The use of anthracite coal as fuel. 2. The vertical tubular boiler. 3. The use of the adhesion of all four wheels.



BALTIMORE AND OHIO "GRASSHOPPER" ENGINE.

The boiler is competent to supply steam to work up to the adhesion of all the wheels at the rate of ten miles an hour, or to produce a continuous horizontal pull of 2322 pounds, equal to drawing 211 tons on a level road at the rate of ten miles an hour, as determined by actual experiment." (*See 9th Annual Report of the B. & O. R. R. Co.*, p. 79.) This engine has drawn, exclusive of its own weight, 17¼ tons up an ascent of 200 feet per mile for 2150 feet, at the uniform rate of six miles per hour. See report of City Council of Baltimore, March 24th, 1836. The weight of this engine varies from 7 to 8½ tons.

Mr. Benjamin H. Latrobe, formerly chief engineer of the Baltimore and Ohio road, contributes to the *Gazette* an elaborate history and description of these engines, from which we have room only for the following extracts:

"It is to be regretted that the history of a machine of such original and remarkable features should not have been earlier written, and while the facts and circumstances connected with it were fresh in the recollection of those concerned in its production. Happily you have succeeded in securing the very accurate drawing of it of which you have sent me a copy in the excellent wood-cut now before me, and as there are one or two of the engines themselves still surviving and at work in the company's yard at their Mount Clare Station in transporting materials from one point to another of its extensive area, the memory of this interesting and useful machine is not likely to be lost. This odd nickname of the engine requiring some explanation, it may be well to say here that it grew out of the manner in which the piston-rods were connected with the cranks by means of lever-beams attached to the boiler, and from which long connecting-rods passed down to the cranks so as to resemble the hind legs of a grasshopper. A glance at the drawing will show the likeness plainly.

"The engine was constructed, as has been said, with special reference to the then weak track and strong curves of the Baltimore and Ohio Railroad. It was made, therefore, of moderate weight and short-coupled, so as to press lightly on the track and round the curves easily, (the swiveling truck not having been then suggested;) and that it must have done this last is proved by its being able to work itself through the quadrant of 60 feet radius at the street corners. It was supported upon wheels of small diameter with the same views, and to keep down the centre of gravity, and also to give tractive power with a cylinder of moderate size and pressure of steam, such as was used at that time. The upright boiler was adopted in view of the advantages already enumerated, and of its successful use in the little engine of Mr. Cooper, which seemed to give the maximum of steam-generating capacity in the smallest compass, and hence to be especially favorable to the compactness required in so short an engine. The boiler, affording the readiest and staunchest support to the cylinders, was naturally resorted to for that purpose. This gave them their vertical position, and involved the lever-beam and long connecting-rods, or grasshopper legs. The separate shaft was an accompaniment of the system of gearing required by the small wheels, and relieved it of its objections.

"The fuel used required a strong blast, and this was most effectively obtained by a fan, and this, again, was most readily driven by the exhaust steam, which at the same time was made to heat the water before entering the boiler. The valve motion might have been effected by the generally employed *eccentric*, but the use of properly formed *cams* cut off the steam in a more satisfactory manner in this engine, and at a proportion of the stroke greater or less according to the power to be exerted on the different grades of the road, thus economizing steam. It must then be admitted that, taking it as a whole, the engine was admirably adapted to the road on which it ran, and although it had to give place, in time, to another style of locomotive, it rendered good service and is fully entitled to have its memory perpetuated.

"To assign to each one who had a hand in its design and development his exact share is not now possible for the reasons stated in the earlier part of this memoir. That the larger share is due to Mr. Davis must be conceded, and I understand it to be so by Mr. Winans, to whose advice and inventive talents, however, much of the credit of perfecting the machine is undoubtedly due. What part Mr. Gillingham may have taken I am unable to say; but he may have made practical suggestions in matters of detail. The melancholy circumstances attending Mr. Davis's death would naturally lead us, from sympathy, to award him rather more than less than his share. He appears, however, to have been without question the inventor, as he was the patentee, of the mode of driving, by the exhaust steam, the fan by which alone a draught strong enough to burn anthracite coal in that form of engine was produced. He also suggested the introduction of the wrought-iron ring into the cast-iron road wheel, by means of which the chill of the thread and flange was perfected, and safety from the consequences of fracture secured. Messrs. Gillingham & Winans continued the use of both these inventions of Mr. Davis, and Mr. Winans, in his extensive operations during subsequent years as a manufacturer of locomotive engines and car-wheels, continued the use of the ring.

"The reputation of Mr. Winans as a mechanician and a man of versatile talents and pursuits is too well established and widely known, independently of his connection with the 'grasshopper' engine, to need any aid from that source. The fame of Phineas Davis as a mechanical engineer must rest upon his large share in the design and construction of this machine, so original in most of its features; and hence if he should appear even more prominent in this little memoir than the facts of its history would fully sustain, could they now be all brought to light, no one, I trust, will suffer wrong thereby. I am indebted, as I have already intimated, to Mr. Ross Winans, to the able reports of the company's first Chief Engineer, Jonathan Knight, to my own recollections as an assistant engineer and afterward Mr. Knight's successor, and to those of my brother, who became counsel for the Baltimore and Ohio Company in 1828 and still holds that office, and to whom, as Mr. Knight remarks in one of his reports, belongs the credit of suggesting tasteful embellishments in the external form and finish of the engines, in the improvement of which, although in a different department of the company's service, he took a warm interest."

H. T. & I. N. Keith, of West Sandwich, Mass., are building 70 freight-cars for the Old Colony and Newport Railroad; and the Ranlett Manufacturing Company, of Laconia, are building 100 dump-cars for the same road. One passenger and one switch-engine, and two first-class smoking and baggage-cars, are being built at the shops of the road in South-Boston. All the old passengers-cars of the company are being retopped with the monitor improvement. A new locomotive, named the "Bristow," recently built at these shops, is one of the finest on the road. It weighs 65,000 pounds, has 16 x 24-inch cylinders, and 5½-foot drivers.

The machine-shops of the Boston and Albany Railroad, at Springfield, Mass., are expected to build sixteen locomotives this year, two more than last, and a number greater than any other road in New-England turns out in a year for its own use.

The National Car-Builder,

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Editorial Announcements.

CORRESPONDENCE.—*We cordially invite the coöperation of the railroad public in affording us the material for a good mechanical paper. Articles relating to rolling-stock and machinery, by those practically acquainted with those subjects, will be gratefully received. All communications must be addressed to Vose, Dinsmore & Co., No. 32 Warren Street.*

The name and address of the writer must accompany all communications designed for publication.

ADVERTISING RATES.—*For one square, or one fifth of a column, $5 per month, or $50 a year. For half a square, $3 per month, or $25 a year. Larger advertisements by special contract.*

All communications in regard to advertising should be addressed to L. F. DINSMORE, *Post-Office Box* 4055, *New-York City, who is our agent for advertising, and authorized to make contracts, collections, etc.*

ENGRAVINGS AND ILLUSTRATIONS.

We would invite the attention of Master Car-Builders and others to the advantages to be derived from publishing in THE NATIONAL CAR-BUILDER *engravings designed to illustrate the various features and details of car construction, and especially such improvements as can not otherwise be clearly presented. We will procure cuts to be made in the best manner from drawings or models that may be sent us, and charge only for the cost of engraving, inserting the same in our paper with suitable descriptive details, without charge.*

The Gauge Question.

FROM present indications, it would seem that the narrow-gauge question will, in a few years at the farthest, be practically solved, so as to settle some of the points involved in its discussion, and reduce the controversy to narrower limits. It is estimated that not less than 12,000 miles of three-foot gauge are already projected in this country, for the most of which companies have been organized. About 4000 additional miles are now under contract, and 700 miles are in actual operation. If these projected and unfinished roads are pushed to completion within a reasonable time, we shall soon be in possession of the requisite data to form an intelligent judgment in regard to their economy and practicability. The comparative merits of the narrow and standard gauges can never be determined with precision until the problem has been worked out in practice, or it would have been done before this, and the discussion brought to a close. The case involves too many complications to be readily disposed of. The advantages and disadvantages of the two systems are attended with so many compensations, conditions, and modifications, that they can not be accurately estimated and weighed in the arena of discussion. The most intelligent reasoners are liable to be misled in such cases, and to fall unconsciously into error in striving to reach a conclusion in favor of which the mind has a pre-existing bias.

The enormous cost of our present roads, averaging not less than $50,000 per mile, and the necessity of new trunk-lines with branches and feeders to meet the demands of traffic already waiting, or certain of speedy development, have raised the question as to whether this existing and prospective traffic can not be secured and profitably handled by roads yet to be built, without such an enormous preliminary outlay as is required for the construction and equipment of those of the present standard gauge. The advocates of the narrow-gauge system, including many practical railroad men whose opinions are entitled to great respect, maintain that the present 4 foot 8½-inch gauge is a huge mistake, which has added untold millions to the cost of our existing roads, with no compensating or incidental advantages to be weighed in the opposite scale. They contend that a gauge of three feet is a more economical one, and better adapted, not only to certain localities and particular kinds of traffic, but that it is more worthy of being adopted as a standard; and that roads of this gauge can be built and equipped for less than half the cost of those we now have, and then do a paying business, with freight and passenger rates below the actual cost of transportation on our present roads. If this is so, the sooner we find it out and reduce it to practice, the better. That the correctness of this theory can not be satisfactorily demonstrated on paper, is evident from the arguments of intelligent railway experts, who stoutly contend that narrow gauge is a delusion and fallacy. Others, equally intelligent, concede the utility of the three-foot gauge for certain kinds of traffic, in certain localities, or as feeders to main lines.

That the agitation of this question, and the prolonged discussion growing out of it, will ultimately be of great benefit to railway interests, there can hardly be a doubt. The mere width of gauge is, after all, an incidental matter involved in the higher and more important one of cheaper roads, cheaper transportation, and more extended railway facilities for every nook and corner of our vast territory. It is a question whether most of the advantages in the way of cheap transportation claimed for narrow-gauge roads might not be secured by means of lighter rails and correspondingly lighter rolling-stock upon roads of standard gauge, thus materially reducing the cost of construction, and in case the subsequent increase of business should require greater capacity, heavier rails could be substituted without sacrificing the light equipment, which could be retained or transferred to new roads just struggling into existence. The opponents of the standard gauge have shown very clearly that the freight and passenger service of these roads is encumbered with from ten to forty per cent of dead weight, greatly augmenting their original cost and diminishing the profits on earnings. Every pound of useless weight is a direct impediment to railway progress, and a virtual tax on the industry and resources of the country. To lessen this evil as far as possible, every car in the category of rolling-stock should be constructed so that the maximum of strength and capacity would bear its proper relation to the minimum of weight. Every car contains more or less material which serves no purpose but to tax the motive power, or give increased strength where it is not really needed. A few pounds saved here and there in a piece of timber, a bolt, or a casting, makes an immense difference in the vast aggregate; and if this aggregate is ever to be reduced to legitimate and proper limits, it will be done by the gradual process of dispensing with a few pounds from time to time, in one way or another, as experience may suggest. If the narrow-gauge movement shall eventually lead to the removal of a portion of this incubus of dead weight which is now such an oppressive burden upon railway operation, it will have conferred a lasting benefit on the entire community.

THE topics to be considered at the next monthly meeting of Car-Builders, to be held on the 17th of April, are Car-Axles, Oil-Boxes, and Journal-Bearings. Car-builders and others who are interested in these subjects, are invited to be present and participate in the discussion.

Car-Builders' Monthly Meeting.

THE regular monthly meeting of car-builders was held at the rooms of the association, at 111 Liberty street, on Thursday evening, 20th ult., and notwithstanding the inclemency of the weather, the attendance was quite equal to that of the last previous meeting. Mr. Garey, chairman of the committee on models and drawings, called the meeting to order, when a number of interesting topics were presented for consideration.

Mr. Charles F. Cobb, secretary of the Lock-Nut and Bolt Company, of New-York, was requested by the chairman to explain the working of the "Cumming Nut-Lock," a device designed to prevent the loss of nuts from bolts in the running of railway trains, and the operation of machinery generally. This is effected by the insertion of a key of copper wire or other soft metal into a slot or groove cut into the threaded end of the bolt, so that when the nut is screwed on, it necessarily cuts a thread on the key, the soft metal thereby fitting perfectly into the threads of the nut, making nut and key virtually one piece and inseparable, except by the use of the wrench. When the nut is screwed on, the projecting end of the key is riveted up against it, which destroys the thread on the latter, and effectually prevents the nut from getting loose, or moving forward or backward. The groove being easily cut by machinery, old bolts, which have become too slack for use, can be made as good as new. By means of the wrench, the nuts can be screwed up the entire length of the key, and the latter riveted up as often as required. Mr. Cobb stated that the device had been abundantly tested, and not a single instance of failure had occurred. He also presented figures and statistics designed to show the aggregate saving to railway companies, which would result from the use of it.

Mr. Walter Youmans, of Lansingburg, N. Y., the patentee of an improvement in car-trucks, was also present with a model of the same, and by request of the chairman, explained the merits and peculiarities of its construction. The mechanism is too complicated to be described in detail, but the truck is framed in such a way that the two axles, instead of remaining rigidly parallel while running on curves, automatically assume positions corresponding to the radical curve-line, and also keep at right angles with the straight portions of the track. This is accomplished by the oscillation of the truck-frame about an axis located near one end instead of the centre, causing the inside wheels to come nearer together, and throwing the outside ones farther apart when running on curves, thus overcoming the lateral vibration so injurious to cars and disagreeable to passengers. A box freight-car, with these trucks, has been running on the Rensselaer and Saratoga road a number of years with satisfactory results.

The subject of car-ventilation was next taken up, and a discussion ensued, in which Messrs. Forney, Chamberlain, Leighton, and others participated. While no very marked difference of opinion was developed as to the merits of the various methods now employed, it was conceded by all that the perfect ventilation of cars—that is to say, the expulsion of impure air and the constant introduction of that which is pure to supply its place, in such a way as to give no inconvenience to passengers by an unequal temperature or exposure to direct currents from the outside—was a very difficult thing to accomplish. The general drift of the discussion indicated that if some practicable means could be devised for introducing fresh air of a suitable temperature along the bottom of a car through numerous small apertures, its volume being so distributed as to be imperceptible, and at the same time, sufficient to supply the place of the noxious and second-hand air escaping from exhaust ventilators at the top, it would be as near an approach to perfect ventilation as the nature of the case will permit. The prevailing ignorance and indifference of the great mass of the traveling public in regard to this subject, and the consequent neglect on their part to make a proper use of the means provided, were also mentioned as not among

the least of the difficulties which car-builders and train-men have to contend with.

The subject of check-chains was next taken up. The views, expressed by the various gentlemen who took part in the discussion, disclosed considerable diversity of opinion as to the utility and expediency of these safeguards, some contending that if they were well fastened, they never failed, in cases of derailment, to keep the truck on a line with the car-body; while others maintained they were a fruitful source of trouble and damage in accidents of a different kind.

Mr. Smith, of the Erie road, exhibited a specimen of one of Hopkins's car-journal-bearings, which had run 27,768 miles on a journal 4 inches in diameter by 7 inches long, under a car weighing 58,000 pounds, with six-wheeled trucks. The bearing is made of brass, but the inside, where it comes in contact with the axle, is first tinned and then covered with common lead about 1-16th of an inch thick. This lead is put on simply to allow the bearing to "seat itself" on a new axle, and thus prevent heating when new. The curious part is, that after running more than 27,000 miles, the lead was not worn through to the brass. The car then met with an accident which disabled it. The experiment furnishes very strong testimony in favor of large-journal bearings for car-axles.

After some further conversation, the meeting adjourned. The next meeting will be held on the 17th of April.

A Railway-Supply "Opening."

THE new offices of Vose, Dinsmore & Co., corner of Warren and Church streets, having been recently fitted up for the purpose of affording increased facilities for carrying on the general railway-supply business in connection with the manufacture of car-springs, the event was celebrated, in accordance with conventional usage, by a social reception of their friends on the 20th ult. In response to a card of invitation published in our last issue, a goodly number of gentlemen, in spite of the inclement weather which prevailed, were present on the occasion, including numerous personal friends, representatives of the press, and others, the great majority being identified in various ways with railway interests, and sustaining past and present business relations with the firm as patrons and dealers.

The first or principal floor of the building is spacious and commodious, and extremely well adapted to the requirements of the trade in its several departments, containing a number of offices systematically arranged and fitted up in elegant and tasteful style, affording facilities for the ready dispatch of business in its various details, and suited to the convenience of customers. The leading and most noticeable feature of this floor is the arrangement and classification of the stock of railway-supplies, including numerous articles in the special line of car-trimming and upholstery, also locomotive head-lights, car-springs, steam-gauges, car head-linings, car-lamps, etc.

After due inspection of this part of the establishment, the general appearance of which elicited marked expressions of approval, the guests were introduced to the lower or basement floor, containing a different and more perishable class of supplies adapted to the wants of the physical man, and necessary for maintaining the mysterious connection between soul and body. These consisted of various substantials, and lighter delicacies, with moist accompaniments, all of which were appreciated in a manner mutually gratifying to guests and entertainers, imparting a pleasant exhilaration which counteracted the deleterious effects of the depressing atmospherical humidity out of doors. The exchange of congratulations and friendly greetings rendered the occasion worthy of being remembered by the participants, and the manner of celebrating it one more honored in the observance than the breach. As the evening hours wore on, the guests withdrew, having enjoyed an agreeable reunion characterized by a becoming sobriety suited to the austerities of the Lenten season.

Steel Rails.

THE severity of the past winter has afforded additional evidence of the superiority of steel rails under the influence of extreme low temperature. They do not appear to become brittle, or otherwise liable to break, by such exposure. So far as can be ascertained, the various Western roads having extensive sections of steel-track, do not report a single failure which can be fairly attributed to the effect of frost, while great quantities of iron-rails on both Eastern and Western roads have become either useless or unsafe from prolonged exposure to the intense cold. The superiority of steel as respects safety, durability, and economy, admits of no question, and we are glad to notice that many leading roads are preparing to lay steel-tracks where the traffic is heaviest and most exacting, and ultimately over their entire lines.

The comparative durability of steel and iron rails, of the quality now manufactured, may be safely estimated as ten to one—that is to say, one of the former will outlast ten of the latter—and in many instances a much greater difference is claimed in favor of steel. The only drawback to its general use on all roads is its exorbitant first cost, which puts it beyond the reach of struggling companies. The large and increasing demand, the strikes of colliers and iron-workers, and the high duty on imported steel, all point to still higher prices. This will of course retard the movement; but the entire replacing of iron tracks with steel is only a question of time, and is as sure to take place as was the disappearance of the old flat rail. Companies doing a large business rarely buy iron rails for renewals of track, but confine their purchases to steel; and it is doubtful if there is a railroad company in the country that would not, as a matter of sheer economy, lay its entire line with steel if they had the ability to procure it.

WE are requested to call the attention of parties concerned to the importance of prepaying postage on business circulars sent from the States to master mechanics and car-builders in Canada. An omission to do this compels the parties to whom they are addressed to pay such postage or refuse to receive them. To insure the delivery of circulars, they should be sealed and sent as letters, and the postage (six cents, if not exceeding half an ounce) prepaid in all cases.

Miscellaneous Items.

THE Quincy Car-Manufacturing Company, of Quincy, Ill., has been temporarily organized by the election of W. B. Larkworthy as President, and Ceylon Smith, Secretary. The capital stock of the company is fixed at $50,000, and is divided into five hundred shares. In order that no one may hold a preponderating interest, stock to the amount of $1000 can only be held by one person. The incorporators are all active, practical business men who are determined to insure the success of the undertaking by their individual exertions. It is the intention of the company, as soon as the necessary stock is subscribed, to erect suitable buildings and commence operations at once. The gentlemen having the organization of the enterprise in charge have been perfecting their arrangements for some time, and having carefully studied the operations of similar works at other points, are entirely satisfied with the prospects of the new enterprise, and are pushing matters forward with energy.

THE Louisville and Nashville Railroad recently contracted with the Ohio Falls Car Company for three hundred additional freight-cars. They have had seven hundred and fifty freight-cars built for them since the 1st of September, and have now on the road two thousand four hundred cars. Sixteen locomotives have just been delivered from Rogers's works on a contract for thirty-two made last summer. Even this large increase of rolling stock is to be still further increased to facilitate the business of the road.

A MODE of more safely and effectually warming railway carriages than by stoves or hot water has, it is said, been widely adopted in Germany. The invention consists of the use of a composite fuel, which only smoulders slowly, and is encased in an iron tray inclosed in a copper box "hermetically closed." The heat is said to last twenty-four hours if necessary. The fuel is called the "charcoal brequettes." The cost is said to be almost nominal, and the apparatus costs only seven dollars and fifty cents for each compartment.

THE Terre Haute *Gazette* says that an experienced roadmaster reports that a rail on one of the roads running through that city shrunk to such a degree that it broke the bolt at the fish-joint, and left a large space between rails, caused, it is presumed, by the intense cold.

W. H. HARRISON, heretofore master of machinery of the Pittsburg, Washington, and Baltimore Railroad, at Connellsville, Pa., has been appointed assistant master of machinery of the Baltimore and Ohio road, with headquarters at Piedmont, Mineral Co., West-Virginia. This is a well-deserved promotion. Mr. Harrison is succeeded in his former position by Mr. A. S. Kinsey.

A NEW steam-car has recently been placed on the street lines in Louisville, Ky. It is represented as pleasant and comfortable to ride in, heated by steam-pipes, and consumes its own smoke. The water-tank is underneath the rear end of the car; fuel-box, gauges, and manipulating machinery are all on the front platform, half of the perpendicular boiler is on the platform; the other half within the car, handsomely encased in wood. Its usual rate of speed is six miles per hour, but is capable of running fifteen. There is no difficulty in turning curves, and the car is not wanting in propelling power.

MR. F. GOULD, locomotive engineer on the Chicago, Rock Island, and Pacific Railroad, has invented a self-balancing steam-valve, a trial of which was recently made on a trip from Davenport to Des Moines. The average quantity of coal consumed by an engine, for the same distance, is six or seven tons. With this valve, an express engine made the trip with the usual train, with but five tons of coal.

THE passenger-cars of the Cleveland and Pittsburg, and also of the Cincinnati, Hamilton, and Dayton roads, are furnished with Bibles, which are placed in little racks for the convenience of passengers who prefer this kind of reading to the flash literature too often peddled on trains.

THE Michigan Central Railroad have each of their passenger-cars supplied with axes, to be used for the exit of passengers in case of an emergency, when the doors prove insufficient.

THE Vienna Exhibition building is a remarkable one. The main gallery is 3000 feet long by 650 feet wide. There are connected with this gallery forty-eight transepts, each 250 feet long and 46 feet wide. The dome is the largest ever constructed without central supports. It is 320 feet in diameter and 250 feet high. It is composed entirely of iron. The machinery hall, which is immediately in rear of the principal building, is of large capacity, being 2600 feet long by 100 feet wide. The buildings cover over 63 acres; and, in addition to these buildings, there are numerous buildings and pavilions for various purposes. When it is taken into consideration that the area provided for this exhibition is five times that of the Paris exhibition of 1869, some idea will be formed as to the gigantic nature of the undertaking.

THE directors of the Great Southern and Western Railway, on the recommendation of the locomotive engineers, are about to have some experiments made to test the value of peat as a fuel for their engines.

THE Northern Pacific Railroad Company will send to the Vienna Exhibition a map which will be 50 feet in length, and will show the character and extent of its land. The railroad company will also exhi-

bit a collection of fruits, grains, and other agricultural productions of the North-West, for the purpose of tempting emigration thereto. There will be also on exhibition a collection of ores and minerals, illustrative of of the country's mineral resources.

THE Pacific Rolling-Mills of San Francisco are the only works of that character on the Pacific coast. They manufacture railroad and merchant iron, steamboat-shafts, cranks, pistons, connecting-rods, car and locomotive axles and frames, and hammered iron of every description.

WORK is going on vigorously at the Lebanon Manufacturing Company's Works, recently burned down. The managers have been turning out cars rapidly in the open air, while masons, carpenters and others were busy on the buildings.

A. WHITNEY & SONS, proprietors of the great car-wheel works on Callow Hill, Philadelphia, give employment to 200 men in their establishment. They use 60 tons of metal per day, which makes 250 wheels, an aggregate of about 75,000 wheels a year.

THE Midland Railroad Company of England has entered into a contract with the Pullman Palace-Car Company, for the equipment of that road with American drawing-room and sleeping-coaches.

NEW car-shops for the Northern Pacific Railroad are to be built at Kalama, Washington Territory, and the greater portion of the machinery has been received.

THE engines and cars of the Reading Railroad Company would make a continuous line of seventy miles.

THE Lehigh Valley Railroad has a line of locomotives one mile and a half long, and 14,000 freight-cars.

SEVERAL wooden railroads in operation near Quebec, have an aggregate length of one hundred miles. They have a gauge of four feet eight and one half inches. The running time is sixteen miles an hour, but trains have been run at double that speed. The rails are made of maple strips, four by seven inches in cross dimensions. They are set up edgewise, are notched into the cross-ties four inches deep, and are held by two wedges driven into the notch, on the outside of the rail. The ties, eight inches thick, are laid twenty inches apart. The roads cost from $4000 to $7000 a mile, and the rails will last from two to four years, according to the quality of the timber and the amount of the traffic.

THE Baldwin Locomotive-works, at Philadelphia, turn out ten locomotives every week, employing over 3000 men. It would take the aggregate labor of 1700 men, if it could be concentrated, to make a locomotive in a day. The works have 300 engines under contract, and expect soon to increase their production to two a day. "Old Ironsides," the first locomotive built by Mr. Baldwin, was turned out in 1832, at a cost of $3000. It was a four-wheel engine, 9-inch cylinder, and 18-inch stroke, the driver being 54 inches in diameter. In 1834 the works turned out five in the year.

THE Toledo, Wabash, and Western Railway Company are constructing new mail-cars of the latest pattern, 54 feet long, 9 feet 3 inches wide, and to be finished in the best style. In the interior, many improvements that experience has proved valuable will be adopted. Prominent among these are bottomless boxes, with sacks attached in place of the old-fashioned method of distributing mail. The cars will probably be placed on the road in April.

SPURRED into activity by Westinghouse, the English have been making successful experiments in their railways with a new brake worked by electricity. The invention consists of the application of electro-magnets, exerting a force of six hundred pounds, to pulleys on a swing-shaft underneath the carriages. By merely pressing a key, the guard is enabled to bring the train to a standstill.

THE Chicago, Burlington and Quincy Railroad will soon add 500 freight-cars to its present equipment. The company now have 209 engines, 88 passenger-cars, 44 baggage and express-cars, 2716 freight-cars, and 1000 flat and coal-cars, besides numerous other cars, such as inspection, pay, conductors', dump-cars, etc.

THE Chicago, Rock Island, and Pacific Railroad is nearly or quite supplied with eight or nine new passenger-coaches, sufficient to restore the number which it had lost by the Chicago fire. The new ones, some of which have been on the road only a short time, are truly elegant.

THE Detroit Car and Manufacturing Company have transferred all their real estate in that city, in the block bounded by St. Aubin avenue and Croghan and Macomb streets, and the Detroit and Milwaukee Railroad track, and all the buildings and property whatsoever thereon, to the Pullman Palace-Car Company for $215,930.26.

WE have received from the New-York Central and Hudson River Railroad Company a pamphlet of fifty pages, containing full and detailed specifications for first-class passenger-cars, adopted by that road on the first of January, 1873.

NEW car-works are to be constructed at Swissvale, near Pittsburg, on the line of the Pennsylvania Railroad, occupying thirteen acres of ground.

THE New-Haven Car Company have just completed twenty-eight new passenger-cars for the United States Rolling-Stock Company, and designed to run on the Atlantic and Great Western Railway. They have also sent ten new cars to the Atlantic, Mississippi, and Ohio Railroad, which runs from Norfolk, Va., to Bristol, Tenn.

THE Indiana and Illinois Central Railroad Company is receiving iron rapidly for the completion of the road. Five hundred tons of steel rails are being received now. The road will be completed to the Wabash River some time in April, when it will be open for the running of trains. It will be equipped as well as any road in the West.

MR. JAMES M. FOSS, superintendent of motive power of the Vermont Central Road, will hereafter have charge also of the car department, made vacant by the resignation of Mr. Sessions, master car-builder. Mr. Foss will hereafter be known as superintendent of motive power and cars.

MR. N. L. DAVIS, master mechanic of the Rutland Railroad, will hereafter have charge of the car-shops and cars also.

MR. H. P. ALDRICH, long chief clerk in the office of the master car-builder of the Vermont Central Railroad, has been appointed secretary of the Taunton Car Company.

THE employees of the car-shop of the Vermont Central Railroad at St. Albans, Vt., recently presented Mr. Milton Sessions, who has just resigned his position as master car-builder to accept the general management of the Taunton Car Company, with a valuable clock and a handsome seal ring. Mr. Sessions's wife and daughter were also presented with rings.

MR. L. J. FLEMING has resigned his position as chief engineer and general superintendent of the Mobile and Ohio Railroad, a position he has held for a great many years.

GENERAL J. C. FREMONT & Co. have determined upon Erie, Pa., as the site for the manufacture of improved railroad cars.

THE Indianapolis and St. Louis Railroad Company are about to erect a branch machine-shop, and a round-house with a capacity for 15 engines, in the suburbs of Indianapolis.

A SLEEPING-CAR has recently been introduced on the Edinburgh and Glasgow railway in Scotland. It is 30 feet long, 7½ feet wide, and 6 feet 10 inches high, and divided into three compartments—first class, second class, and luggage. The central or first-class compartment is fitted up with all the conveniences common to the American sleeping-car.

Facetiæ.

ONE day, when Mrs. Partington heard the minister say there would be a nave in the new church, she observed that "she knew who the party was."

A cow at Rome, Ga., lay down recently and her tail froze to the ground. A Southern paper, in giving a pathetic account of the affair, says that when the cow got up there was another snap.

THE press, the pulpit, and the petticoat. The first spreads the news, the second spreads religion, and the last spreads—all over the pavement.

WESTERN women are grumbling terribly because the managers of agricultural fairs don't give at least a year's notice when they offer prizes for the finest babies.

A DANBURY man says he has read of beggars dying with stockings full of silver, but the only beggars he ever saw had *real estate* in theirs.

A REPORTER of the Poughkeepsie *Eagle* interviewed a winter menagerie, and left most of his trowsers against the bars of the cage occupied by a hyena.

"LENNY, you're a pig," said a father to his five-year-old boy. "Now, do you know what a pig is, Lenny?" "Yes, sir; a hog's little boy."

SOME "blarsted" foreigner says, "Give an American a newspaper and a pie, and he will make himself comfortable anywhere."

AN old lady describes a genius as "a man what knows more'n he can find out, and spills vittles on his clothes."

"WERE you ever baptized?" inquired an earnest minister of a green candidate. "No—no—o, sir! Never only once't, and then I fell in!"

AN old colored minister, in a sermon on hell, pictured it as a region of ice and snow, where the damned froze throughout eternity. When privately asked his purpose in representing Gehenna in this way, he said, "I don't dare to tell dem people nuffin else. Why, if I were to say dat hell was warm, some o' dem old rhumatic niggas would be wantin' to start down dar de bery fust frost!"

IN a recent debate, a member of the California Legislature exclaimed: "The honorable gentleman from Calaveras County is undoubtedly a person of great abilities, a man of talent, a natural born genius; but there is one thing which I defy him to do, and that is *to bite the bottom of a frying-pan without smutting his nose.*"

A ST. LOUIS gentleman took a room at a Chicago boarding-house recently, and was aroused early the following morning by the chambermaid, who remarked that, as it was near time to set the breakfast-table, she would have to trouble him for the top sheet.

WIFE: "Well, what did Mr. Brown say? Will he let us have the money?" Husband: "He s-s-aid you'd f-f-find it wi-wiser in the end to p-p-p—" Wife: "To what? If you can't speak without stuttering, sing it" Husband, singing (triumphantly): "To paddle your own ca-n-o-o."

AN Arkansas farmer was absent-minded enough to leave his pet panther and his mother-in-law at home together while he went to a show; but, much to his anger and amazement, the old lady was alive and the panther was dead on his return.

AN old lady said to her sons: "Boys, don't you ever spekerlate or wait for something to turn up. You might as well go and sit down on a stone in the mid dle of a medder, with a pail 'twixt your legs, and wait for a cow to back up to you to be milked."

CINCINNATI is building a mammoth sausage for the Vienna Exhibition. It will be made in sections in a broad-gauge railroad tunnel, the hogs being driven in and subjected to hydraulic pressure. It will then be rafted down the Mississippi to New Orleans, and towed to Trieste by the Great Eastern.

THEY attempted to kill a book agent in Omaha last week. He was robbed, thrown into the river, knocked off the cars, pitched from a high bridge into the river again, but in two hours after came round with a new illustrated edition of the Bible, and tried to get the subscription of the leader of the attacking party.

SOME genius has announced it as his belief that there will be such facilities for traveling "bime-by" that you can go anywhere for nothing, and come back again for half-price.

THE Nebraska Indians are allowed to ride free on all trains they can jump on while the latter are in motion. The tribe is being reduced very rapidly.

A LEAVENWORTH editor sat down in a reserved seat already occupied by a hornet. He stands up when scissoring his editorials now.

THE world has had its iron age, its golden age, and its age of bronze; but the present is the age of steal.

TWO of the best conundrums we ever heard were perpetrated the other day in a social circle of gentlemen, one of whom had a very bald head. One gentleman asked,

"Why is Mr. ——'s head like Alaska?"

All gave it up.

"Because it is a great white bear place."

Hardly had the laugh subsided when another asked,

"Why is his head like heaven?"

This was worse to get at than the other, and the answer came,

"Because there is no dying or parting there."

Publishers' Notices.

IRON-CLAD PAINT.—We would call the attention of car-builders and others, who require a cheap, heavy and durable paint for wood or metallic surfaces, to the article manufactured by the Iron-clad Paint Company, of Cleveland, Ohio. As a mineral paint, it is unequaled in every desirable quality, being made of the purest Lake Superior iron ore, and specially adapted to all outside surfaces where protection is needed against fire, rust, moisture, or other destructive causes. The material is finely pulverized, easily mixed, and when properly applied, finishes up with a fine glossy surface. For car-bodies and roofs, stations, bridges, and other structures, its excellent qualities have been thoroughly and satisfactorily tested, as appears from numerous testimonials of car-builders, railway officials, and others who are constantly using it. See advertisement, page 89.

COLORS FOR FREIGHT AND COAL-CARS.—The Lehicton Paint, Linseed-Oil, and Color-Works, at Easton, Pa., under the management of the proprietor, Mr. C. E. Hecht, manufactured and sold during the year 1872 nearly four hundred tons of paint and colors for outside car-work. The growth of the business from a small beginning to its present dimensions, has rendered necessary more improved facilities, which will shortly be provided. Water-power is used, which greatly lessens one item of expense, and enables the proprietor to turn out paints and colors at correspondingly diminished cost. See advertisement on third page of cover.

Brinckerhoff, Turner & Co.,

Manufacturers and Dealers in

COTTON DUCK,

For Car Covering and Car Seats,

14 to 150 inches wide. Also Agents

UNITED STATES BUNTING COMPANY.

A full supply, all Widths and Colors, always in Stock.

142 Duane Street, New-York.

E. A. BRINCKERHOFF,
J SPENCER TURNER,

THEODORE POLHEMUS,
H. D. POLHEMUS, Special.

Charcoal Roofing Plates,

Russia Sheet Iron,

AND ALL METALS NECESSARY FOR

Car and Locomotive Works.

A. A. THOMSON & CO.,

213 and 215 WATER STREET,

NEW-YORK.

NATIONAL

LOCOMOTIVE AND MACHINE WORKS.

DAWSON & BAILY,

MANUFACTURERS OF

LOCOMOTIVES.

Narrow Gauge Locomotives a Specialty.

OFFICE AND WORKS

AT CONNELLSVILLE, PENN.

HARRISBURG FOUNDRY

AND

Machine Company,

HARRISBURG, Pa.

Manufacture all kinds of Machinists' and Car-Builders' Tools, for working Iron, such as Lathes, Planers, Sloting Machines, Horizontal Drilling and Boring Machines, Vertical Drills, all sizes, Shaping Machines, Bolt Cutters, Nut Tappers, Car Wheel Borers, Hydraulic Wheel Press, Axle Lathes, etc. Patent Sectional Tubular Boiler, safety and great economy at moderate cost.

Also Oil Tank Cars, Boiler and Sheet Iron Work of all kinds, Foundry Cupolas, Cranes, Ladles, etc.

SAMUEL FISKE,
General Manager.

THE BUFFALO CAR COMPANY

BUFFALO, N. Y.,

ARE NOW PREPARED TO RECEIVE ORDERS FOR ALL KINDS OF

FREIGHT CARS.

These works, recently completed, are furnished with the very latest and best Machinery, and are prepared to furnish the better qualities of work with promptness.

J. N. MILEHAM, *Superintendent.*
G. STEDMAN WILLIAMS, *Secretary.*

SOUTH-WESTERN CAR CO.,

Jeffersonville, Ind.,

BUILDERS OF

RAILROAD FREIGHT CARS,

And Manufacturers of

CAR WHEELS.

P. O. Address, LOUISVILLE, KY.

Views of Buildings, Machinery, Landscapes, and Book Illustrations, at reasonable rates.

MAHOGANY,

Walnut, Satin-Wood, Rosewood, Hungarian Amboine, Thuya, Ash, and all kinds of Hard and Fine Woods, in

Planks, Boards, and Veneers.

WE INVITE THE SPECIAL ATTENTION OF

CAR BUILDERS.

GEO. W. READ & CO.

OFFICE, MILL, AND YARD:

186 to 200 Lewis St., cor. Sixth St., E. R.

☞ Branch Salesrooms: 170 and 172 Centre Street.

☞ Orders by mail promptly and faithfully executed.

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SAFE CAR LAMP.

MINERAL SPERM OIL.

WILLIAMS, PAGE & COMP'Y,

BOSTON,

Manufacturers of their well-known Car Lamps, and of superior Car Candle Lamps, are making **Mineral Sperm Oil Lamps,** now used by all the roads in Massachusetts, and many other roads East and West, and by many of the Pullman Palace Cars, in place of Kerosene or Candles. Circulars, Lithograph, and Price-List sent when requested.

WILLIAMS, PAGE & CO.

A. W. LADD,

No. 5 DEY STREET, NEW-YORK,

Will cut to order for Bridge and Railroad Builders, ***White Pine, Georgia*** and ***Florida Pine, Hemlock*** and ***Oak Timber.***

Agent for ROBERT BROWN, Telegraph Contractor.

Telegraph Lines of any length built with Brooks' Patent Paraffine or Glass Insulation and American Compound or English Galvanized Wire at the lowest rates and shortest notice. Also, Wire Fence for Railroads.

REFERENCES:

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MANUFACTURER OF

Railroad Car Head Linings,

15 Hamilton Street,

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Particular attention paid to Drawing-Room and Sleeping Car Linings.

Refers to J. JONES, Esq., Sup't Car Dep. N. Y. C. R.

WILLARD HAWES & CO.,

IMPORTERS AND DEALERS IN

Rosewood, Mahogany,

WALNUT,

FANCY WOODS and VENEERS,

370 and 372 Washington Street,

Yard and Steam Saw-Mill, Foot 8th Street. E. R.,

NEW-YORK.

POST & KALKMAN,

111 Liberty Street, New-York,

MANUFACTURERS OF

Denison's Patent Cooling and Lubricating Compound,

FOR COOLING HOT JOURNALS.

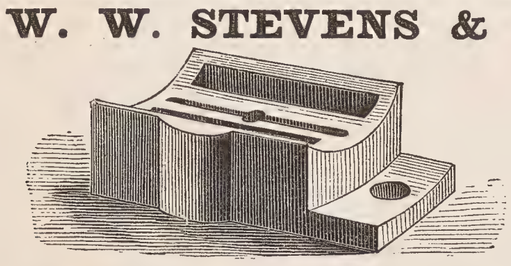
It will immediately cool a *hot journal* while the cars are in motion, and no journal will heat where the box is packed with it.

And Dealers in Machinists' and Railroad Supplies.

Prescott's Patent Safety Valve.

W. B. POST. C. J. POST. C. W. KALKMAN.

G. W. W. STEVENS & CO.,



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And manufacturers of other Railway Journal Bearings, and general Brass Founders and Finishers,

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D. S. STEVENS, *Manager.*

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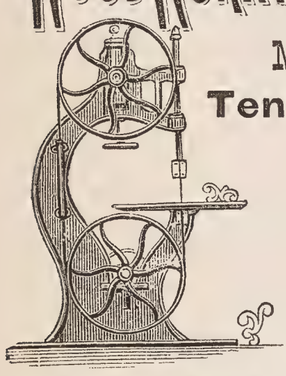

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SUPERIOR TO ANY IN USE.

BRUSHES OF EVERY DESCRIPTION

On Hand, and Made to Order.

SEND FOR CIRCULAR.

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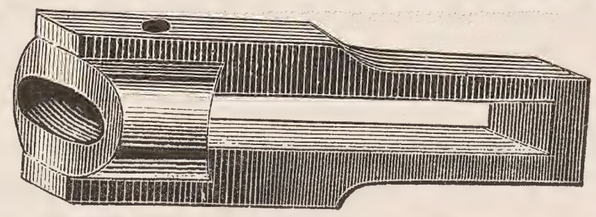

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DRAW-BAR-HEAD AND BUMPER

FOR RAILWAY CARS.

The head is welded to the bar instead of rivetting, which makes it more durable and stronger, and a great saving to any Railroad Company in repairing drawheads, as not one of our plan will be broken where fifty of the ordinary kind will fail. Any wrought-iron bar that can be repaired at all, can be changed to the Ross & Arthur Patent, and at a cost as low as to repair the old style of bar. Rights for sale to car manufacturers and railroad companies. For further particulars address the Patentees, ALEX. ROSS & JOHN ARTHUR, Freeport, Ill., P. O. Box 590; or, VOSE, DINSMORE & CO., No. 32 Warren Street, New-York City.

LUNT & LEE,

SUCCESSORS TO

LUNT, DE FORD & LEE,

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Plushes, Cloths, Carpets, Satins, Curtain Silks, Cotelines, etc.,

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S. H. MUNSON,

DEALER IN ALL KINDS

RAILROAD, STEAMBOAT,

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Agent for the sale of FRENCH, WATSON & CO.'S SHOVELS.

71 Kingston Street, Boston.

Goods furnished promptly and at short notice.

C. T. Raynolds & Co.,

[ESTABLISHED 1770.]

106 and 108 Fulton Street, New-York,

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Superfine Quick Drying Coach Colors,

Prepared expressly for the finest description of

CAR AND LOCOMOTIVE DECORATION

OUR OWN SPECIAL BRANDS OF

Superior Railway Varnishes

Are now used by some of the most extensive Railroads in the country, and are particularly recommended.

Manufacturers of Car Painters' Brushes in every variety. Special Brushes made to order.

A full line of Chamois Skins, Painters' Cutlery, Bronze Powders, Gold Leaf; Engineers' and Architects' Supplies always in Stock.

AGENTS FOR PRINCE'S METALLIC PAINT AND BREINIG'S IMPROVED LINSEED OIL.

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Anderson, J. R. & Co	Richmond. Va.
Altoona Manufacturing Co	Altoona. Pa.
Adrian Car Co	Adrian. Mich.
Arlington Car Manufacturing Co	Arlington, Vt.
Atlantic Car Works	Salem. Mass.
Barney & Smith Manufacturing Co	Dayton. Ohio.
Baker, Jackson & Co	Latrobe, Pa.
Billmeyer & Smalls	York. Pa.
Bradley, Osgood	Worcester, Mass.
Bridgeport Car Works	Bridgeport, Pa.
Brill, J. G. & Co	Philadelphia, Pa.
Bitner, George W	Pittsburg. Pa.
Buffalo Car Co	Buffalo, N. Y.
Canada Car Co	Toronto, Canada.
Canada, F. E & Co	Chicago, Ill.
Canada Steam-Engine Co	Kingston, Canada.
Cartersville Car Co	Cartersville, Ga.
Central Car & Manufacturing Co	Jackson, Mich.
Clendenning, W. W	Montreal.
Cummings Car-Works	Jersey City, N. J.
Connellsville Machine and Car Co	Connellsville, Pa.
Corunna Car Co	Corunna, Mich.
De Pere Iron Works	De Pere, Wis.
Detroit Car Works	Detroit, Mich.
Detroit Car and Manufacturing Co	Detroit, Mich.
Dawson Manufacturing Co	Dawson, Ga.
Dickey, Neill & Co	Toronto.
Dickson Manufacturing Co	Scranton, Pa.
Erie Car-Works	Erie, Pa.
Elmira Car-Works	Elmira, N. Y.
Fredericks & Co	Catasauqua. Pa.
Freas Brothers & Thornton	Berwick, Pa.
Fremont Car Co	Fremont, Ohio.
Gardner, F. & Co.	Carlisle, Pa.
Gill, John L	Columbus, Ohio.
Gilbert, Bush & Co	Troy, N. Y.
Goold, James & Co	Albany, N. Y.
Goodrich Car Co	Augusta, Ga.
Haskell & Barker Car Co	Michigan City, Ind.
Harrisburg Car Manufacturing Co	Harrisburg, Pa.
Heathcote, Herbst & Co	Glen Rock, Pa.
Hamilton, William & Son	Toronto.
Harlan & Hollingsworth Co	Wilmington, Del.
Indiana Car Co	Cambridge City, Ind.
Indianapolis Car Co	Indianapolis, Ind.
Jackson & Sharp Co	Wilmington, Del.
Jackson & Woodin Manufacturing Co	Berwick, Pa.
Jones, J. M. & Co	West-Troy, N. Y.
Kimball Manufacturing Co	San Francisco, Cal.
Keith, H. T. & I. N	W. Sandwich, Mass.
Laporte Car Manufacturing Co	Laporte, Ind.
Lombard, Thomas	Augusta, Me.
Lebanon Manufacturing Co	Lebanon, Pa.
Lehigh Car Manufacturing Co	Stemton, Pa.
Litchfield Car Manufacturing Co	Litchfield. Ill.
Mansfield Machine Works	Mansfield, Ohio.
Michigan Car Co	Detroit, Mich.
McNairy, Claflen & Co	Cleveland, Ohio.
Murray, Dougall & Co	Milton, Pa.
McVay, Walker & Co	Braddock's Field, Pa.
Mowry Car and Wheel Works	Cincinnati, O.
Middletown Car & Manufacturing Co	Middletown, Pa.
Missouri Car and Foundry Co	St. Louis, Mo.
New-Haven Car Co	New-Haven. Ct.
Niblo, James M	Conshohocken, Pa.
Ohio Falls Car Co	Jeffersonville, Ind.
Ontario Car Co	London, Ont.
Patten Car Works	Bath, Maine.
Peabody & Crangle Bro's	Calais, Me.
Peters, Simon	Quebec.
Pittsburg and McKeesport Car Co	McKeesport, Pa.
Pittsburg Car and Locomotive Co	Pittsburg, Pa.
Portland Co	Portland, Me.
Pullman Car Co	Chicago.
Peregoy, J. H	Houston, Texas.
Quealy Car & Iron Works	Hannibal, Mo.
Ranlet Car Manufacturing Co	Laconia, N. H.
Russell & Co	Massillon, Ohio.
Sands, William L	Pottstown, Pa.
Schoharie Machine Co	Schoharie, N. Y.
Schall, Michael	York, Pa.
Shaaber & Johnston	Reading, Pa.
Southern Car-Works	Independence, La.
South-Western Car Co	Jeffersonville, Ind.
Shoenberger & Bryant	Duluth, Minn.
Seath & Hager	Terre Haute. Ind.
Stephenson, John & Co	New-York, N. Y.
Taunton Car Co	Taunton, Mass.
Tredegar Co	Richmond, Va.
Tiffin Car-Works	Tiffin, Ohio.
Vigo Foundry and Terre Haute Car-Works	Terre Haute, Ind.
Wharton, Thomas J	Brunswick, Ga.
Whittaker, Phillips & Co	Toledo, Ohio.
Wason Manufacturing Co	Springfield, Mass.
Weimer, P. L & Bros	Lebanon. Pa.
Wyoming Valley Manufacturing Co	Wilkesbarre, Pa.
Wells, French & Co	Chicago, Ill.
Wilmington Car-Works	Wilmington, Del.

Car-Wheel Manufacturers.

Albany Car-Wheel Works	Albany, N. Y.
American Paper Car-Wheel Co	Pittsford, Vt.
Atlantic Iron-Works	Portsmouth, Va.
Baltimore Car-Wheel Foundry Co	Baltimore, Md.
Barnum & Richardson Manufacturing Co	Chicago, Ill.
Barney & Smith Manufacturing Co.	Dayton, Ohio.
Bass & Hanna	Fort Wayne, Ind.
Bailey, Howson & Co	St. Paul, Minn.
Blanchard & Arnold	Milwaukee, Wis.
Boston Car-Wheel Co	Camb'gep't, Mass.
Bowler, Mayer & Brayton	Cleveland, Ohio.
Davenport, Fairbairn & Co	Erie, Pa.
Dawson Manufacturing Co	Dawson, Ga.
Detroit Car-Wheel Works	Detroit, Mich.
Fulton Foundry Co	Cleveland, Ohio.
Gill, John L. Jr	Allegheny City, Pa.
Green, D. P. & Co	St. Louis, Mo.
Hamtramck Car-Wheel Works	Detroit, Mich.
Haskell & Barker Car Co	Michigan City, Ind.
Harrisburg Car Manufacturing Co	Harrisburg, Pa.
Heartt, Jonas S. & Co	Troy, N. Y.
Jackson & Woodin	Berwick, Pa.
John L Gill	Columbus, Ohio.
Lobdell Car-Wheel Works	Wilmington, Del.
Louisville Car-Wheel & Railway Supply Co	Louisville, Ky.
Middlebrook & Mack	Oswego, N. Y.
Missouri Car and Foundry Co	St. Louis, Mo.
Moore Elastic Car-Wheel Co	Jersey City, N. J.
Mowry Car and Wheel Works	Cincinnati, Ohio.
Ohio Falls Car Co	Jeffersonville, Ind.
Pettengill. Glass & Co	Cleveland, Ohio.
Quealey, W. J.	Hannibal, Mo.
Ramapo Wheel & Foundry Co	Ramapo, N. Y.
Rutland Foundry & Machine Co	Rutland, Vt.
Sterling Car-Wheel Foundry	Columbus, Ohio.
Scoville, J. & N. C	Buffalo. N. Y.
St. Louis Car-Wheel Co	St. Louis, Mo.
Taylor Iron Works	High Bridge, N. J.
Thompson. Duglas	Bordentown, N. J.
Tredegar Company	Richmond, Va.
Toronto Car-Wheel Co	Toronto, Can.
Washburn, Hunts & Co	Jersey City, N. J.
Washburn Car-Wheel Manufacturing Co	Worcester, Mass.
Wason Manufacturing Co	Springfield, Mass.
Whitney A. & Sons	Philadelphia, Pa.
Woodbury & Company	E. Cambr'ge, Mass.
Wyoming Valley Manufacturing Co	Wilkesbarre, Pa.

Locomotive Builders.

Baldwin Locomotive Works	Philadelphia, Pa.
Brooks Locomotive Works	Dunkirk, N. Y.
Danforth & Cooke	Paterson, N. J
Dawson & Baily (light locomotives)	Connellsville, Pa.
Dickson Manufacturing Co	Scranton, Pa.
Grant Locomotive Works	Paterson, N. J.
Hinckley Locomotive Works	Boston, Mass.
Manchester Locomotive Works	Manchester, N. H.
Mason, William	Taunton, Mass.
McKay Iron and Locomotive Works	Jersey City, N. J.
Portland Company	Portland, Me.
Porter, Bell & Co. (light locomotives)	Pittsburg, Pa.
Pittsburg Locomotive Works	Pittsburg, Pa.
Rogers Locomotive Works	Paterson, N. J.
Rhode Island Locomotive Works	Providence, R. I.
Schenectady Locomotive Works	Schenectady, N. Y.
Taunton Locomotive Works	Taunton, Mass.

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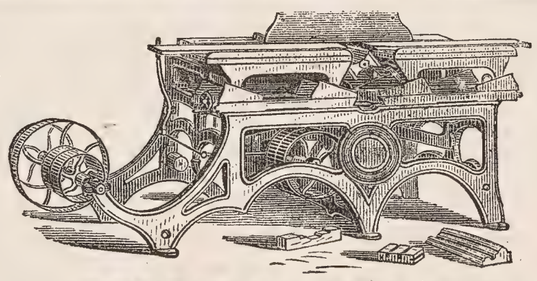

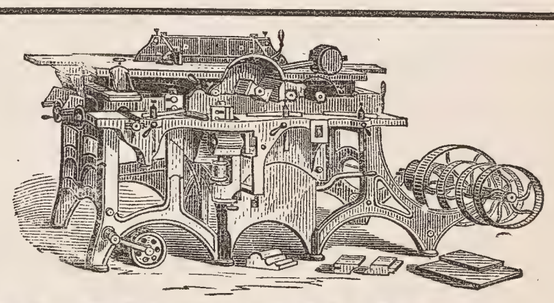

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Albany & Susquehanna	R. C. Blackall	R. C. Blackall	Albany. N. Y.
Alexandria & Fredericksburg			Alexandria, Va.
Alexandria, Nebraska & Iowa	Geo. Q. Adams		Alexandria, Mo.
Atchison, Topeka & Santa Fee	H. V. Farris		Topeka, Kans.
Atchison & Nebraska	Ira Petrie		Atchison, Kan.
Alabama & Chattanooga	S. W. Tozer	S. W. Tozer	Chattanooga, Tenn.
Atlanta & West-Point	Wm. Rushton		Atlanta, Ga.
Atlanta & West-Point	R. D. Cole	R. D. Cole	Newnan, Ga.
Atlantic & Gulf	C. E. Van Vorst	P. N. Raynal	Savannah, Ga.
Atlantic & North-Carolina	E J. Clayton	E. J. Clayton	New-Berne, N. C.
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Atlantic & Great Western	William Fuller	D. S. Dockstader	Meadville, Pa.
Atlantic & Great Western	N. Wright	W. G. Haggard	Cleveland, Ohio.
Atlantic & Great Western	‖J. B. Miller.	S. V. Smith	Kent, Ohio.
Atlantic & Great Western	Allen Cook	J. W. Holmes	Galion, Ohio.
Atlantic & Pacific	§John Hewitt	John Hewitt	St. Louis, Mo.
Atlantic, Mississippi & Ohio			
Norfolk & Petersburg Division	J. S. Whitworth	J. S. Whitworth	Norfolk, Va.
South-Side of Virginia "	J. T. Robinett	J. T. Robinett	Petersburg, Va.
Virginia & Tennessee "	F. Sterk	W. A. Morgan	Lynchburg, Va.
Virginia & Kentucky "			
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Androscoggin	Ira K. Russell.	C. S. Greenwood	Farmington, Maine.
Adirondack			Saratoga, N. Y.
B			
Baltimore & Ohio	§John C. Davis	J. S. Shryack.	Baltimore, Md.
Baltimore & Ohio		James H. Miller	Baltimore, Md.
Baltimore & Ohio	Wm. Edwards		Martinsburg, Va.
Baltimore & Ohio	A. J. Cromwell		Piedmont, Va.
Baltimore & Ohio	E. W. Lippencott		Grafton, W. Va.
Baltimore & Ohio			Wheeling, W. Va.
Central Ohio Division	Alex. Platt		Zanesville, Ohio.
S'dusky, Mans., & New'k Div.	Wm. Y. Johnson		Sandusky, Ohio.
Bangor, Old Town & Milford	J. B. Peckham	John H. Brown	Bangor, Maine.
Bangor & Piscataquis		J. W. Comins	Old Town, Maine.
Bellefonte & Snow Shoe	H. D. Landis	H. D. Landis	Bellefonte, Pa.
Belvidere Delaware	R. McDowell	John Silvers	Lambertville, N. J.
Boston & Albany	Wilson Eddy	F. D. Adams	Springfield, Mass.
Boston & Albany	A. B. Underhill	W.E.Chamberlain	Allston, Mass.
Boston & Providence	George Richards.	John Lightner	Roxbury, Mass.
Boston, Clinton & Fitchburg	John Webster	Samuel Stevens	Fitchburg, Mass.
Boston, Concord & Montreal	R. Adams	M. R. Elkins	Lake Village, N. H
Boston & Maine	F. A. Waitt		Boston, Mass.
Boston & Maine		D. C. Richardson.	Lawrence, Mass.
Boston, Lowell & Nashua	L. R. Winslow		Boston, Mass.
Boston, Lowell & Nashua		S. A. Davis	Nashua, N. H.
Blossburg & Corning	O. C. Patchell	O. C. Patchell	Corning, N. Y.
Brockville & Ottawa	Joseph Cockfield.	Joseph Cockfield	Brockville, Can.
Blue Ridge			Anderson. S. C.
Burlington & Missouri River	G. Chalender		Burlington, Iowa.
Burlington & Missouri River	J. Christiansen		Plattsmouth, Neb.
Burlington, Cedar Rapids & Minn	R. W. Bushnell		Cedar Rapids, Iowa.
Buffalo, New-York & Phila	Allen Vail	Chas. Burchard	Buffalo, N. Y.
Boston, Hartford & Erie	Geo. E. Boyden	Elias E. Pratt	Boston, Mass.
Buffalo, Corry & Pittsburg	Thomas Connell	Thomas Connell	Corry, Pa.
Buff. Bayou, Brazos, Colorado		M. Borst	Harrisburg, Tex.
C			
California & Pacific	O. R. Ford	D. Rutherford	Vallejo, Cal.
Camden & Amboy	F. B Stevens		Hoboken.
	T. T. Kerr	E. Lockwood	Bordentown, N. J.
	Thomas Single		South-Amboy.
Camden & Atlantic	E. Collings	S. Wills	Camden, N. J.
Canada Southern	C. E. Benton	C E. Benton	St.Thomas, Canada.
Catawissa	A. J. Prescott	C. D. Ellis	Catawissa, Pa.
Cape Cod	E. A. Walker	William Cannon	Hyannis, Mass.
Catasauqua & Fogelsville	Thomas Evans	Chas. J. Holbach	Catasauqua, Pa.
Carrolton & Oneida	M. T. Wiggins		Carrolton, Ohio.
Charleston & Savannah	H. T. Calder		Charleston, S. C.
Chesapeake & Ohio	W. G. Freeman	J. N. King	Richmond, Va.
Chesapeake & Ohio	T. J. Hamer		Huntingdon, W.Va.
Cheraw & Darlington	D. W. Haines	A. M. Corrie	Florence, S. C.
Champlain Trans. Co.	H. T. Calder		Burlington, Vt.
Cheshire & Ashuelot	F. A. Perry	F. A. Perry	Keene, N. H.
Charlotte, Columbia & Augusta	Robert King	J. Q. Seats	Columbia, S. C.
Chicago & North-western		Thomas Hull	Chicago, Ill.
Wiscon. Mad. & Mill. Divis		Henry Hull	Fond du Lac, Wis.
Galena Division		Hugh Gray	Chicago, Ill.
Wiscon. Mad. & Mill. Divis	T. B. Tilton		Chicago, Ill.
Iowa Division	C. C. Elliott	William Campbell	Clinton, Iowa.
Peninsula Division	S. L Pierce		Escanaba, Mich.
Chicago & Alton	John A Jackman	R. Reniff	Bloomington, Ill.
Chicago, Burlington & Quincy	‡Geo. Chalender		Aurora, Ill.
Eastern & Middle Division	E. T. Prindle	W. W. Wilcox	Aurora, Ill.
Galesburg Division	Wm. Wilson		Galesburg, Ill.
Quincy Division	Joel West		Quincy, Ill.
Burlington Division	S. E. Burtch		Burlington, Iowa.
Buda Division	P. R. Sutton		Buda, Ill.
Chicago, Cincinnati & Louisville	C. F. Kidder	D. B. Howe	La Porte, Ind.
Chicago, Clinton & Dubuque	P. R. Sutton		Dubuque, Iowa.
Chicago, Dubuque & Minnesota	P. R. Sutton		Dubuque, Iowa.
Chicago, Rock Island & Pacific	T. B. Twombly	B. K. Verbryck	Chicago, Ill.
Chicago & Michigan Lake Shore	Wm. L. Fitch.	Oliver Udell	St. Joseph, Mich.
Chicago, Danville & Vincennes	J. A. Wood	W. H. Dunham,	Momencee, Ill.
Chicago, Danville & Vincennes	J. M. Sanborn		Chicago, Ill.
Chicago, Danville & Vincennes		W. H. Dunham	Danville, Ill.
Chicago & Canada Southern	§§J. Johann		Trenton. Mich.
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Cleveland, Mt Vernon & Delaware	J. W. Holloway	J. W. Holloway	Akron, Ohio.
Cincinnati, Hamilton & Dayton	William Cullen	W. H. H. Allison	Cincinnati, Ohio.
Cincinnati & Muskingum Valley	Leroy Kells	Daniel Jewell	Lancaster, Ohio.
Cincinnati & Indianapolis Junction	W. McKinzie	Edwin Beeny	Indianapolis, Ind.
Cincinnati, Sandusky & Cleveland	John Y. Beatty.	William Earick	Sandusky, Ohio.
Columbus, Chicago & Indiana Central	(See Pitts. Cinn. & St. Louis)		
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Concord & Claremont	J. N. Lander	A. Langmaid	Concord, N H.
Connecticut River	John Mulligan	R. Hitchcock	Springfield, Mass.
Connecticut Valley	C. W. Hollister	N. A. Smith	Hartford, Ct.
Connecticut Western	N. Slingland		Hartford, Ct.
Contoocook River			Concord, N. H.
Conn. & Passumpsic Rivers	Horace Alden	Horace Alden	Lyndon, Vt.
Cumberland Valley	A. S. Hull	C. W. Nitterhouse	Chambersburg, Pa.
Cumberland & Pennsylvania	W. L. Jordan	J W. Sauerbach	Mt. Savage, Md.
Central of Georgia		C. C. Millar	Savannah, Ga
Central of New-Jersey	*T. W. Peeples	George Hackett	Elizabethport, N. J.
Lehigh & Susquehanna Div	L. C. Brastow	L. C. Brastow	Wilkesbarre, Pa.
Central Branch Union Pacific	Wm. D. Rowley		Atchison, Kansas.
Central R. R. of Iowa	F. Woodruff	O. R. Ford	Marshall, Iowa
Central Pacific	A. J. Stevens	Benjamin Welch	Sacramento, Cal.

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Danbury & Norwalk	Charles A. Craig		Danbury, Ct.
Dayton & Michigan	William Cullen	W. H. Allison	Cincinnati, Ohio.
Denver & Rio Grande	John Greenwood		Denver, Col.
Delaware, Lackawanna & Western	Walter Dawson	Robert McKenna	Scranton Pa.
Des Moines Valley	James Lamb	R. E. Smith	Keokuk, Iowa.
Detroit & Milwaukee	Andrew Wilson		Detroit, Mich.
Detroit, Lansing, & Lake Michigan	Tho. G. Roberts		Detroit, Mich.
Delaware & Hudson Canal Co.	James Dickson	Thomas Orchard	Carbondale, Pa.
Rensselaer & Saratoga Div			Troy, N. Y.
Dorchester & Delaware			Cambridge, Md.
Dubuque South western	I. M. Smith	I M. Smith	Farley. Iowa.
Dutchess & Columbia	W. G.Vanbuskirk	H. A. Webster	Fishkill, N. Y.
Dunkirk, Warren & Pittsburg	J. C. Haggett	J. C. Haggett	Dunkirk, N. Y.
E			
Eastern		J. P. Somerby	Salem, Mass.
Eastern	John Thompson		East-Boston, Mass.
East-Tennessee & Virginia	Eli Hixon	Jos. Armbruster	Knoxville, Tenn.
East-Tennessee & Georgia	Eli Hixon		Knoxville, Tenn.
East Pennsylvania		Samuel Reeves	Reading, Pa
Elizabethtown and Paducah	W. D. Robb	T. A. Cordrey	Elizabethtown, Ky.
Erie Railway	‖‖M. E. Brown		Susquehanna, N. Y.
Erie Railway	James B. Gregg		Susquehanna, N. Y.
Erie Railway	H. L. Brown	C. A. Smith	Jersey City. N. J.
Erie Railway	J. G. Hubbard	M. Wilder	Buffalo, N. Y.
Erie Railway	W. E. Cooper	W. E. Cooper	Hornellsville, N. Y.
Erie Railway		W. E. Rutter	Elmira, N. Y
Evansville & Crawfordsville	John L. White	Joseph Stiker	Evansville, Ind.
Evansville. Henderson & Nashville	H. M. Smith	W. H. H. Price	Henderson, Ky.
European & North Am. (of Maine)	A. O. Bailey	J. H. Brown	Oldtown, Maine.
Erie & Pittsburg	G. J. Parkin	John Young	Erie, Pa.
Evansville, Terre Haute, & Chicago			Terre Haute, Ind.
F			
Flushing & North Side	Wm. La Suer		College Point, L. I.
Florida	A. W. Taylor	G. Hernandez	Fernandina, Fla
Flint & Pere Marquette	Sanford Keeler	Sanford Keeler	East-Saginaw, Mich.
Fitchburg	Geo. A. Cooledge	Enos Varney	Charlestown, Mass.
Fitchburg & Worcester	John Webster	Samuel Stevens	Fitchburg, Mass.
G			
Grand Trunk		Warren Noyes	Gorham, Me.
Grand Trunk	†Richard Eaton	J. W. W. McWood	Montreal, Canada.
Grand Trunk		Howard Fry	Sherbrooke, Can.
Grand Trunk		B. J. Mitchell	Portland, Me.
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Grand Rapids & Indiana	J. M. Boon		Fort Wayne, Ind.
Great Western of Canada	†Wm. A. Robinson	F. Childs	Hamilton, Canada.
Georgia	William Hardman	T. M. Preval	Augusta, Ga.
Greenville & Columbia	J. T. Price	J. T. Price	Helena, S. C.
H			
Harlem Extension	George W. Blanchard		Rutland. Vt.
Harlem Extension		C. S. Clapp	Bennington, Vt.
Hanover Branch	John J. Bingley	Henry Britcher	Hanover, Pa.
Hartford & New-Haven	John O. Chapman	F. Leppense	Hartford, Ct.
Hannibal & St. Joseph	H. A. Towne	H. C. Whiting	Hannibal, Mo.
Hartford, Providence & Fishkill	Edwin Garfield	V. D. Perry	Hartford, Ct.
Hackensack & New-York	Abra'm Angausen		Hackensack, N. J.
Housatonic	C. R. Morris	J Ferris	Bridgeport, Ct.
Houston & Texas Central	W. H. Purdy	W. H. Purdy	Houston, Texas.
Houghton & Ontonagon			L'Anse, Mich.
Houston Tap & Brazoria	T. J. Shellhorn	T. J. Shellhorn	Houston, Texas.
Huntington & Broad-Top Mountain	J. Salisbury	M. Tellerhoof	Saxton. Pa.
Hempfield	T. Marsh		Wheeling. Va.
Houston & Great Northern	T. J. Shellhorn	T. J. Shellhorn	Houston, Texas
I			
Indianapolis, Cincinnati & Lafayette	J. S. Patterson	S. Griffith	Cincinnati, Ohio.
Indianapolis, Peru & Chicago	John McKenna	John McKenna	Peru, Ind.
Illinois Central	**S. J. Hayes.	H. O. Wadlie	Chicago, Ill.
Chicago Division	Henry Schlacks		Chicago, Ill.
South ivision	David Oxley		Centralia, Ill.
North Division	J. B. Edams.		Amboy, Ill
Iowa Division	Thomas W. Place		Waterloo. Iowa.
Iowa & Missouri State Line			Farmington.Iowa.
Iron	Perry Scott.	Clem. Roetling	Ironton, Ohio.
Indianapolis & St. Louis	Wm. Barkla	R. B. More	Mattoon. Ill.
Indianapolis. Bloomington & Western	Tho. V. Losee	Tho. V. Losee	Urbana, Ill.
Ionia & Lansing	H. Loughlin		Lansing, Mich.
Indianapolis & Vincennes	A. E. Allcott		Indianapolis, Ia.
Ithaca & Athens	F. A. Brown		Ithaca, N. Y.
J			
Jeffersonville, Madison & Indiana	Reuben Wells	John Higgins	Jeffersonville, Ind.
K			
Knox & Lincoln			Bath, Maine.
Kentucky Central	J. R. Ledyard	J. L. Hackathorn	Covington, Ky.
Knoxville & Charleston			Knoxville, Tenn.
Kansas Pacific	**L. H. Waugh		Wyandotte, Kansas.
Denver Pacific Div	**L. H. Waugh		Wyandotte, Kansas.
Denver & Boulder Valley Div	**L. H. Waugh		Wyandotte, Kansas.
Junction City & Ft.Kearney Div	**L. H. Waugh		Wyandotte, Kansas.
Arkansas Valley Div	**L. H. Waugh		Wyandotte, Kansas.
Kalamazoo, Allegan & Grand Rapids			Kalamazoo, Mich.
Kansas City, St. Joseph & Council Bluff	H. L. Cooper	J. Aylesbury	St. Joseph, Mo.
L			
Lake Erie & Louisville	John Pero		Fremont, Ohio.
Lake Superior & Mississippi	W. McFarland	A .Coburn	St. Paul, Minn.
Lackawanna & Bloomsburg	Chas. Graham		Kingston, Pa.
Lehigh Valley	John I. Kinley		South-Easton, Pa.
Lehigh Valley	P. Hofecker	E. R. Brown	Weatherly, Pa.
Lehigh Valley	A. Mitchell	Mauch Chunk, Pa.	Delano, Pa.
Lehigh Valley	D. Clark		Hazleton. Pa.
Leavenworth, Lawrence & Gal	S. M. Philbrick		Lawrence, Kansas.
Little Rock & Fort Smith	A. Klohs		Little Rock. Ark.
Little Miami	J. H. Setchel		Cincinnati, Ohio.
London & Port Stanley			London, C. W.
Louisville, New-Albany & Chicago	Jacob Losey	Jacob Losey	New-Albany, Ind.
Long Island	Chs. A. Thompson		Hunter's Point, L.I.
Louisville, Cincinnati & Lexington	E. B. Gibbs	S. S. Pilson	Louisville, Ky.
Louisville & Nashville	†Thatcher Perkins		Louisville. Ky.
Louisville & Nashville	Jas. Montgomery		Bowling Green, Ky.
Louisville & Nashville		Isaac Owens	Louisville, Ky.
Louisville & Nashville	Tho. Welsh		Memphis, Tenn.
Louisville & Nashville	Richard Dolby		Edgefield, Tenn.
Louisville & Nashville	Wm. Russell		Decatur, Ala.
Louisville & Nashville	D. P. Rennie		Birmingham, Ala.
Nashville & Decatur Division	C. D. Knowles		Nashville, Tenn.
South & North Ala. Div.	John Skidmore		Birmingham, Ala.
Lake Shore & Michigan Southern	‡James Sedgley	††John Kirby	Cleveland. Ohio
Michigan Southern Division	William Hill		Elkhart, Ind.
" " "		S. S. Knapp	Adrian, Mich.
Toledo Division	Geo. H. Tier	Frank O. Bray	Norwalk. Ohio.
Erie Division	L. O. Gassett	J. Withyecombe	Cleveland Ohio.
Buffalo Division	W. L. Wallace	A. Robson	Buffalo, N. Y.
Lake Shore & Tuscarawas Valley	Charles Fellows	J. D. McIlwain	Black River. Ohio
Lake Ontario Shore	J. C. Schermerhorn	J. C. Schermerhorn	Oswego, N. Y.
M			
Marquette & Ontonagon	A. P. Burroughs	H. D. Lyons	Marquette, Mich.
Macon & Augusta			Macon, Ga.
Maine Central	J. W. Philbrick	J. W. Philbrick	Waterville, Me.
Macon & Western	D. M. Gogul	James A. Knight	Macon, Ga
Manchester & Lawrence	Chas. L. Eastman	M. W. Dickerman	Concord, N. H.

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Marietta & Cincinnati	E. Bosley	E. Bosley	Chillicothe, Ohio.
Memphis & Little Rock	N. Greener	C. W. Wooldridge	Huntsville, Ark.
Memphis & Charleston	Michael Burk	A W. Drew	Memphis, Tenn.
Memphis & Charleston	H. N. Burford	Fabien Varin	Huntsville, Ala.
Mineral Point	Robert Hay		Mineral Point, Wis.
Mississippi & Tennessee	James Eblen	James Eblen	Memphis, Tenn.
Mississippi Central	Henry Gibbon	John E. Becton	Water Valley, Miss
Maryland & Delaware	Samuel Peters		Greensboro, Md.
Mississippi, Gains. & Tus			Gainsville, Ala.
Midland Pacific			Nebraska City, Neb.
Milwaukee & St. Paul	T. S. Davis	Wm. E. Kittrege	Milwaukee, Wis.
Milwaukee & St. Paul		John Baillie	Milwaukee, Wis.
Milwaukee & St. Paul	J. Pattee	D. F. Wilson	Minneapolis, Minn.
Hastings & Dakota Division	C. C. Clements		Hastings, Minn.
Michigan Central	A. S. Sweet, Jr.	J. B. Sutherland	Detroit, Mich.
Grand River Valley Division		James Potts	Jackson, Mich.
J'kson, Lans'g & Saginaw Div.	Andrew Wilson	Andrew Wilson	Jackson Mich.
Montgomery & West-Point	J. McVey	W. H Daniels	Montgomery, Ala.
Montgomery & Eufaula	James McCann	I. E. Holmes	Montgomery, Ala.
Mobile & Montgomery	James McFarland.	L. Barham	Montgomery, Ala
Mobile & Girard	William Eyles	A. J. Nix	Girard, Ala.
Mobile & Ohio	L. J. Fleming	John McHugh	Mobile, Ala.
	B. S. Skates	B. S. Skates	Whistler, Ala.
Missouri River, Fort Scott & Gulf	John S. McCrum		Kansas City, Mo.
Missouri River, Fort Scott & Gulf		Josiah Stahl	Wyandotte, Kan.
Missouri, Kansas & Texas	C. T. McIlvaney	J. Townsend	Sedalia, Mo.
Missouri, Iowa & Nebraska	Geo. Adams	Geo. Adams	Alexandria, Mo.
N			
Nashville & Chattanooga	John U. Eastman	J. G. Sawyer	Nashville, Tenn.
New-Bedford & Taunton	Robert Chase	Robert Chase	New-Bedford, Mass.
New-Canaan			New-Canaan, Ct.
New-Brunswick & Canada	T. Armstrong	T. Armstrong	S'nt Andrew's, N.B.
New-Haven & Northampton	Henry Fox	Henry Fox	New-Haven, Ct.
New-York & Harlem	Wm. M. Strong	Leander Garey	New-York.
New-York Central & Hudson River	‡G. B. Van Vorst		Albany, N. Y.
New-York Central & Hudson River	Henry Watkeys		Syracuse, N. Y.
New-York Central & Hudson River	Amos Gould		Rochester, N. Y.
New-York Central & Hudson River	Jas. Butman	Wm. Johnson	Buffalo, N. Y.
New-York Central & Hudson River	Wm. Buchanan	John McKenna	New-York.
New-York Central & Hudson River	John Dikeman		East-Albany, N. Y.
New-York Central & Hudson River		Joseph Jones	West-Albany, N. Y.
New-York Central & Hudson River		George Rowe	Niagara Falls, N.Y.
New-York, Boston & Montreal			E. Tarrytown, N.Y.
New-York & Oswego Midland	Wm. H. Griggs	Wm. H. Griggs	Oswego, N. Y.
New-York, Providence & Boston	Jas. H. Anderson	Jas. H. Anderson	Providence, R. I.
New-York, New-Haven & Hartford	H. Kittendorf	James Danvers	New-Haven, Ct.
New-Jersey Midland			Godwinsville, N. J.
New-Jersey Southern	Rufus Blodgett		Manchester, N. J.
New-Haven & Derby			New-Haven, Ct.
New-Orleans, Opelousas & Gt. Western	John McCluskey	Matthew Nolan	Algiers, La.
New-Lisbon			Leetonia, Ohio.
New-Orleans & Ohio	John R. Jordan	John R. Jordan	Paducah, Ky.
New-Orleans, Jackson & Gt. Northern	John Conlon	Charles Bartine	New-Orleans, La.
New-Haven, Hartford & Springfield			Hartford, Ct.
Naugatuck	Henry Hanford	George W. Gray	Bridgeport, Ct.
Newark & Bloomfield	Luke F. Tronson		Hoboken, N. J.
Nova Scotia	W. Johnson		Bedford, N. S.
North-Carolina	Rufus D. Wade	B. G. Sergeant	Co. Shops, N. C.
New-Orleans, Mobile & Texas	Josiah Bettis	W. H. Johnson	Mobile, Ala.
Northern Central	C. M. Lewis		Baltimore, Md.
Northern Central		G. W. Demarest	York, Pa.
North-Lebanon		Henry B. Oves	Lebanon, Pa.
North-Pennsylvania	Franklin Roop	Franklin Roop	Philadelphia, Pa.
North Eastern	D. W. Haines	A. M. Corrie	Florence, S. C.
Northern	James W. Lander	Albert Langmaid	Concord, N. H.
Northern of New-Jersey	T. W. Demorest		New-York.
Norwich & Worcester	Richard Colburn	G. R. Bentley	Norwich, Ct.
Northern of Canada	P. Clark.	P. Clark	Toronto, Can.
Northern Pacific	§§Geo. W. Cushing		St. Paul, Minn.
O			
Old Colony & Newport	J. K. Taylor	A. Gleason	Boston. Mass.
Orange, Alexandria & Manassas	James E. Waddey	John T. Nalls	Alexandria, Va.
Oil City & Pithole	George Thompson		Pithole, Pa.
Oil Creek & Alleghany River	J. S. McElroy	Jacob Williams	Corry, Pa.
Oil Creek & Alleghany	H.J.Bookhammer.	John Monks	Oil City, Pa.
Ohio & Mississippi		G.Hibbard	Cochran, Ind.
East Division	A. Thompson		Cochran, Ind.
West Division	H. Elliott	G. H. Thompson	East St. Louis, Ill.
Oregon & California	§§J. Brandt.		Portland, Oregon.
P			
Paris & Decatur	John G. Clifford		Paris, Ill.
Panama	Chas. E. Stewart	J. G. Wilson	Aspinwall, N. G.
Pacific of Missouri	§§John Hewitt	John Hewitt	St Louis, Mo.
Pennsylvania	§§F. Thomson		Altoona, Pa.
Pennsylvania	H. D. Garrett	I. W. Van Houten.	W. Philadelphia, Pa.
Pennsylvania	E. L Caum	Samuel W. Myers.	Harrisburg, Pa.
Pennsylvania	G. W. Strattan	John P. Levan	Altoona, Pa.
Pennsylvania	D. O. Shaver.	R. S. Ramsey	Pittsburg, Pa.
New-Jersey Division	John Headden	David H. Baker	Jersey City, N.
West-Penn. Division	C. B. Street	James F. Elder	Blairsville, Pa.
Philadelphia & Erie	Martin Walls	George J. Mason.	Sunbury, Pa.
	W. L. Forster	Robt M.Messimer.	Renovo, Pa.
	W. L. Holman	Wm.P. Newcomb.	Kane, Pa.
	W. T. Smith.	David Cowley	Erie, Pa.
Philadelphia, Wilmington & Baltimore	S. A. Hodgman	S. A. Hodgman	Wilmington, Del.
Philadelphia & Reading	L. B. Paxson	Aaron Steinbach	Reading, Pa.
Philadelphia, Germ'n & Norris'n	John Moyer	Nathan Pawling	Philadelphia, Pa.
Philadelphia & Baltimore Central	S. D. Danfield	SamuelD.Danfield.	Chester, Pa.
Pittsburgh, Cincinnati & St. Louis			
Pittsburgh & Columbus Division	E. Pierce		Dennison, Ohio.
Pittsburgh & Columbus Division		James McGee	Steubenville, Ohio.
Little Miami Division		M. P. Ford	Columbus, Ohio.
Little Miami Division	J. H. Setchel		Pendleton, Ohio.
Col., Cin. & Ind. Division	Robert Curtis	Tho. Chamberlain.	Columbus, Ohio.
Col., Cin. & Ind. Division	Geo. H. Prescott	Geo. H. Prescott	Logansport, Ind.
Peoria & Rock Island	Theo Mosher		Peoria, Ill.
Pittsburg, Fort Wayne & Chicago	S. M. Cummings	John Marquis	Alleghany, Pa.
Pittsburg, Fort Wayne & Chicago	J. M. Boon.		Fort Wayne, Ind.
Pittsburg, Fort Wayne & Chicago		J. J. Kirkland	Crestline, Ohio.
Pittsburg, Washington & Baltimore	A. S. Kinzie	J. M. Rutter	Connellsville, Pa.
Peoria, Pekin & Jacksonville	R. F. Hurd	R. F. Hurd	Pekin, Ill.
Peninsular		T. G. Templeton	Battle Creek, Mich
Portland & Rochester	John G. Brady	John G. Brady	Portland, Me.
Portland & Kennebec	John Ellis	C. H. Kenison.	Augusta. Me.
Portland & Oxford Central	Geo. W. Battles.	Geo. W. Battles.	Buckfield, Me.
Portland, Saco & Portsmouth	John Donnell		Portland. Me.
Port Royal	C. W. Furber	E. Hubard	Port Royal, S. C.
Port Hope, Lindsay & Beaverton	H G Taylor	H. G Taylor	Port Hope, Can.
Port Huron & Lake Michigan	R. C. Stewart	R. C. Stewart	Port Huron, Mich.
Providence, Warren & Bristol	Rufus Smith	J. Brightman	Bristol, R. I.
Portsmouth, Gt. Falls & Monmouth	James Tucker	E. Fall	Union Village, N.H.
Petersburg & Weldon	R. B. Andrews	Alex. Wright	Petersburg, Va.
Providence & Worcester	Joseph Kelly	Olney L Smith	Providence, R. I.
Poughkeepsie & Eastern	John L Driscoll	John L. Driscoll	Poughkeepsie, N. Y.
R			
Raleigh & Gaston.	J. B. Gayle	J. B. Gayle	Raleigh, N. C.
Richmond, Fredericksburg & Potomac	H. Kuhn	W. H. Trainham	Richmond, Va.
Richmond, Danville & Piedmont	John McFarland	H. Longest	Richmond, Va.
Richmond & Petersburg	John O'Brien	J. J. Martin	Richmond, Va.
Richmond & York River	C. H. Harris	J. L. Thompson	Richmond, Va.
Rome, Watertown & Ogdensburg	Wm. Jackson	H. H. Sessions	Rome, N. Y.
Reading & Columbia	B. Van Lew		Columbia, Pa.
Rome, Georgia.	O. W. Harbin	O. W. Harbin	Rome, Ga.
Rochester & Genesee Valley	M. E. Brown	M. Wilder	Buffalo, N. Y.
Rockford, Rock Island & St. Louis	Joseph Elder	J. F. Nolte	Beardstown, Ill.
S			
Southern Pacific of California	J. P. Wilson	F. N. Bellisle	San Francisco, Cal.
St. Croix & Lake Superior			New-York City.
St. Croix & Penobscot	Edward Bolton	A G. Page	Milltown, Me.
St. Lawrence & Ottawa	Calvin Dame.	Calvin Dame	Prescott. Canada.
St. Louis & Iron Mountain	O. A. Haines	Oscar Doolittle	Carondelet, Mo.
St. Joseph & Denver City	E. Sleppy		Elwood, Kan.
San Antonio & Mexican Gulf	W. T. Bingham		Victoria, Texas.
South Side of Long Island	Geo. H. Griggs	M. Heitzman	Williamsburg, L. I.
St. Paul & Sioux City	F. C. Butterfield		Shakopee, Minn
St. Louis, Vandalia, T. Haute & Ind.	C. R. Peddle	H. Kirmse	Terre Haute, Ind.
South-Carolina	W. B. Smith	John Reed	Charleston, S. C.
Southern Central	Chas. G. Brown	H. Mooney	Auburn, N. Y.
Southern Minnesota	Wm. Lininger		Wells, Minn.
South-Western of Georgia	C. D. Wall.		Columbus, Ga.
South-Western of Georgia	D. M.Gogul	James A. Knight.	Macon, Ga.
South Shore	Warren E Ray		Cohasset, Mass.
Stanstead, Shefford & Chambly	W. H. Smith		Waterloo, C. E.
Seaboard & Roanoke	J. B. Pendleton	J. B. Pendleton	Portsmouth, Va.
Stonington & Providence	J. H. Anderson	J. H. Anderson	Providence, R. I.
Selma & Gulf	Wm. T. Daughtrey.		Selma, Ala.
Selma, Rome & Dalton	A. G. Maynes	W W. Peirce	Selma, Ala.
Sioux City & Pacific	Charles Foster	J. R. Dow.	Missouri Val., Iowa.
Spartanburg & Union	J. N. Benner	Jacob Rice	Union C. H., S. C.
Sheboygan & Fond du Lac	— Patterson		Sheboygan, Wis.
Sullivan & Erie			Tonawanda, Pa.
Syracuse & Binghamton, N. Y.	B. G. Merrill.	B. G. Merrill.	Syracuse, N. Y.
Syracuse Northern	W. Garrison	J. C. Smith	Syracuse, N. Y.
Sycamore & Cortland			Sycamore, Ill.
St. Louis & South-Eastern	L. B. Salisbury		Mt. Vernon. Ill.
Nashville Division	H. M. Smith		Nashville, Tenn.
St. Louis, Kansas City & Northern	John E. Calhoun	C. S. Buck	St. Louis, Mo.
T			
Taunton Branch.			Taunton, Mass.
Tioga	Peres Bonny	D. H. Stratton	Blossburg, Pa
Texas & New-Orleans	R. B. Baer		Houston, Texas.
Tennessee & Pacific	William McKeand.	William McKeand.	Nashville, Tenn.
Toledo, Wabash & Western	W. F. Ray		Fort Wayne, Ind.
Toledo, Wabash & Western		David Hoit	Toledo. Ohio.
	T. G. Gorman		Springfield, Ill.
Toledo, Peoria & Warsaw	A. H. De Clerq	R. M. Hemphill	Peoria. Ill.
Troy & Boston	Foster Church	R. V. Coon	Troy, N. Y.
Toronto, Grey & Bruce.			Toronto, Can.
U			
Union Pacific	I. H. Congdon	Geo. E. Stevens	Omaha, Nebraska.
Utica & Black River	Wm. E. Granger	David James	Utica, N. Y.
Utica, Chenango & Susquehanna	C. H. Brown		Utica, N. Y.
V			
Vicksburg & Meridian	Jas. B. Brown		Vicksburg, Miss.
Vineland			Vineland, N. J.
Vermont Central	J. M. Foss	J. M. Foss	St. Albans, Vt.
Rutland Division	N. L. Davis	F. M. Sessions	Rutland, Vt.
New-London Northern Division	J. W. Dow	S. W. Caulkins	New-London, Ct.
Ogdensburg & L. Champlain Div.	William A. Short.	J. R. Ames	Malone, N. Y.
Vermont & Massachusetts	D. T. Davis	Jacob Marsh	Fitchburg, Mass.
W			
Wicomico & Pocomoke			Berlin, Md.
Wilmington, Charlotte & Rutherford	W. A. Gill	Thomas Myers.	Laurenburg, N. C.
Wilmington, Columbia & Augusta	George Hall	W. J. Calais	Wilmington, N. C.
Westchester & Philadelphia	John Moyer	N. Pawling	Philadelphia, Pa.
Wilmington & Weldon	John Bissit	John Bissit	Wilmington, N. C.
Wilmington & Western			Wilmington, Del.
West-Jersey	W. McAllister	C. C. Williams	Camden, N. J.
Western Maryland	R. V. Dohoney	J. H. Nussear	Union Bridge, Md.
Winona & St. Peter	F. C. Ford	H. L. Preston	Winona, Minn.
Western North-Carolina	E. H. Marsh	E. H. Marsh	Salisbury, N. C.
Western R. R. N. C	M. W. Atkinson	M. W. Atkinson	Fayetteville, N. C.
West-Feliciana	R. C. Brower		Woodville, Miss.
Western & Atlantic	John H. Flynn	John Sherman	Atlanta, Ga.
Worcester & Nashua	Albert Griggs	Albert Griggs	Worcester, Mass.
Welland	William Wells	William Pay	St. Catharine, C. W.
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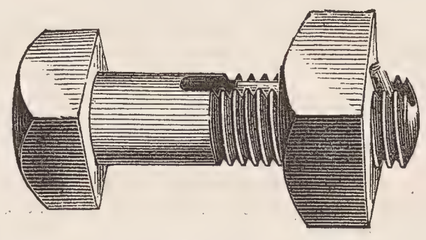
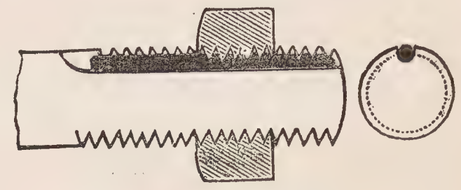


"CUMMING NUT-LOCK,"
Patented
June 16, 1868,
August 23, 1870.



SECTIONS.

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This simple device, as will be seen by the engravings, consists of a groove being cut in the threaded part of a screw bolt into which is placed a key of copper wire, or other soft metal; when the nut is screwed on, it cuts a thread on the key, thereby making it impossible for the key to get out until the nut is taken off. When the nut is screwed up to its place, that part of the key over which the nut has passed is riveted up against the nut with a small punch, destroying the thread on the key. The nut, therefore, can not move backward until force is used, as with a wrench.

The groove can be rapidly cut with a simple machine designed for the purpose.

Experience has proved this device absolutely reliable, and it is the cheapest of all known devices for the purpose. By its use, old bolts on which the nuts have become too slack for use can be made as good as new, making it a great saving to railroad companies and others in that item alone. It is cheaper than a check-nut.

If the bolt should become slack from shrinking of timber or other causes, *the nut will always remain firmly attached to the bolt*, and, with the wrench, can be screwed up *any distance*, and the wire riveted up any number of times, or can be taken off without injury to the nut or bolt.

This is the only method in use that locks the nut firmly to the bolt without regard to place or surroundings, all others require some attachment that holds the bolt in its position, and a washer or other attachment to keep the nut from turning.

DIRECTIONS FOR USE.—Place the copper key in the slot, pointed end out, and beveled side up, in such a position that when the nut is screwed to its place about three-eighths of an inch of the key will project beyond its outer face. Then screw the nut to its place *over the key*, allowing it to cut its own thread in the copper. Then take a narrow flat set punch, and rivet the projecting part of the key *solidly* against the outer face of the nut. To tighten the nut: screw it up, and rivet the key tighter. To remove the nut: simply apply the wrench and unscrew the nut. It will cut its own way out through the copper. The same key can be used several times, by moving it outward a few threads in the slot.

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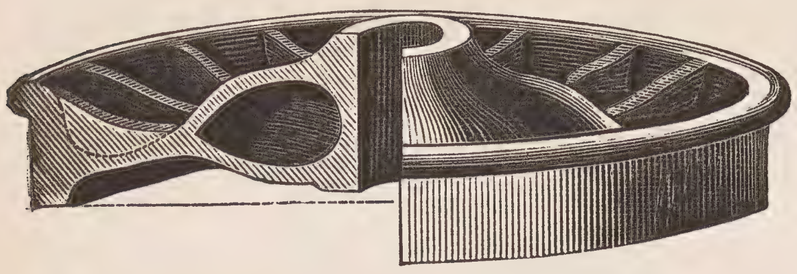

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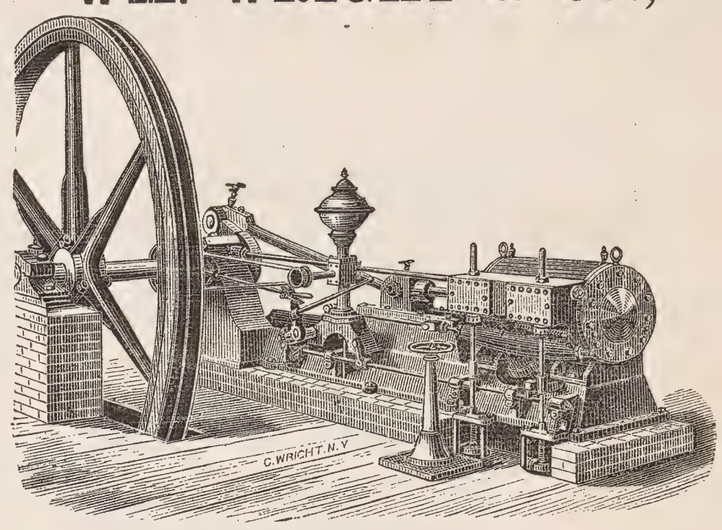

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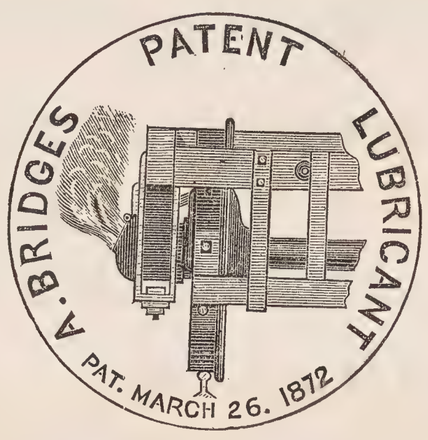

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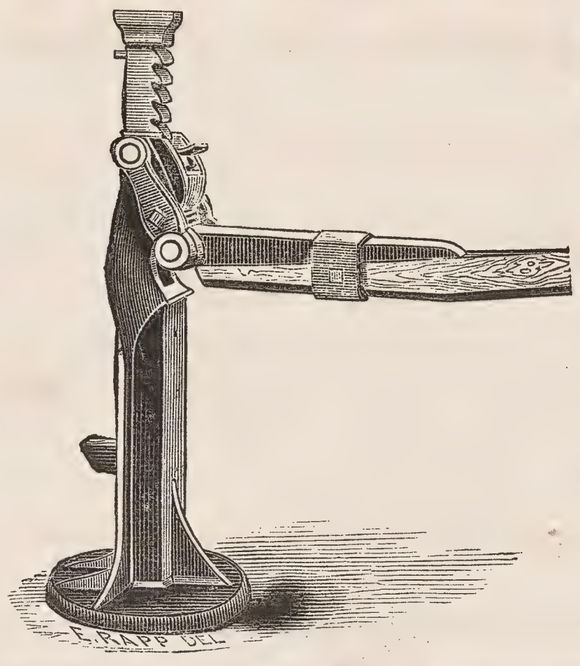

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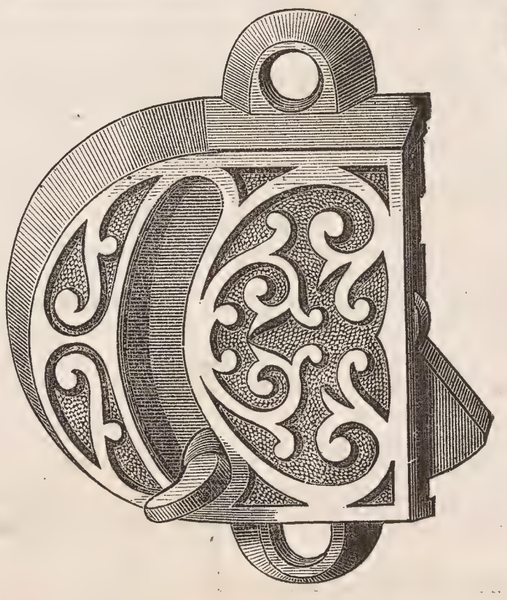

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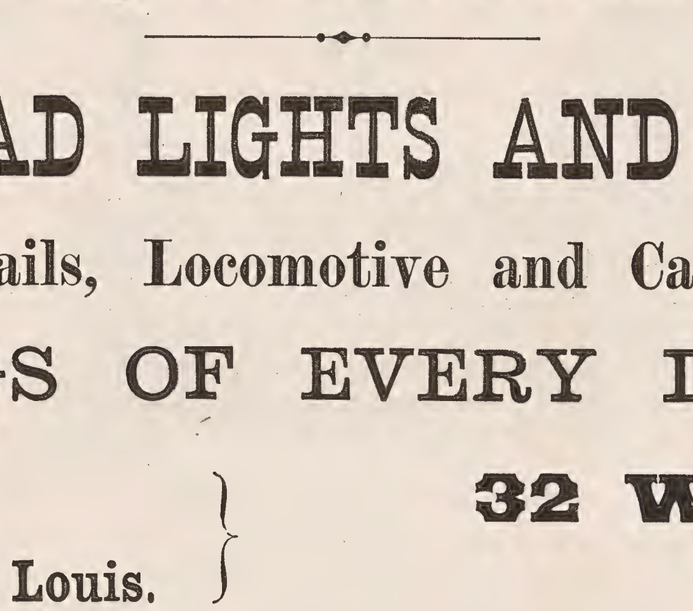

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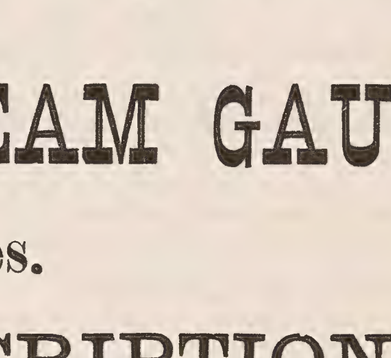

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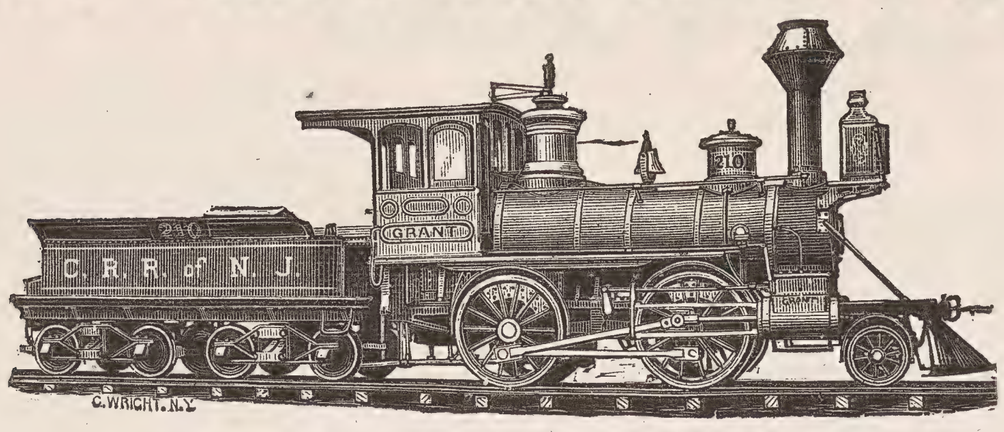

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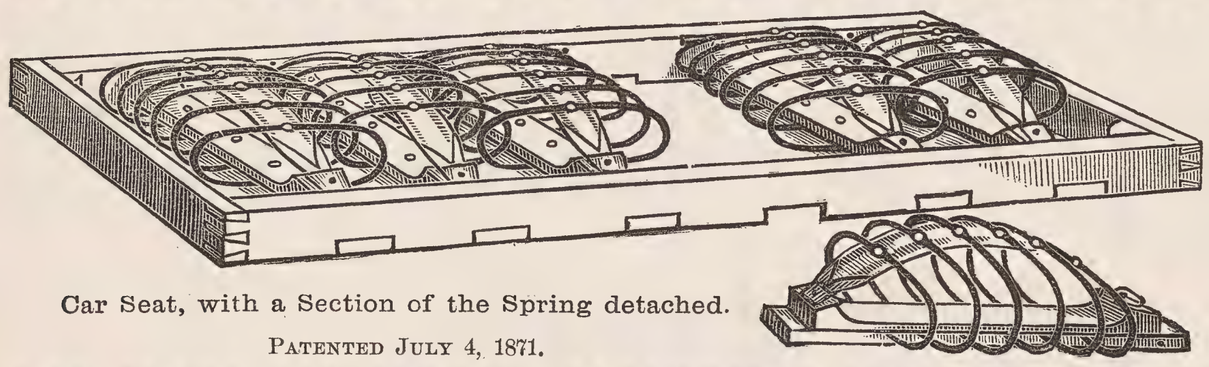

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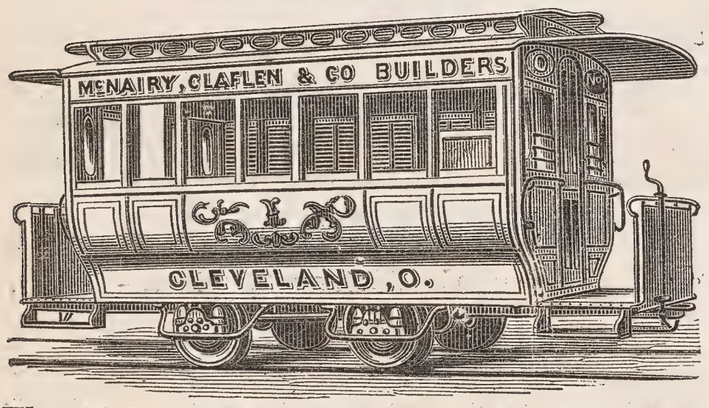

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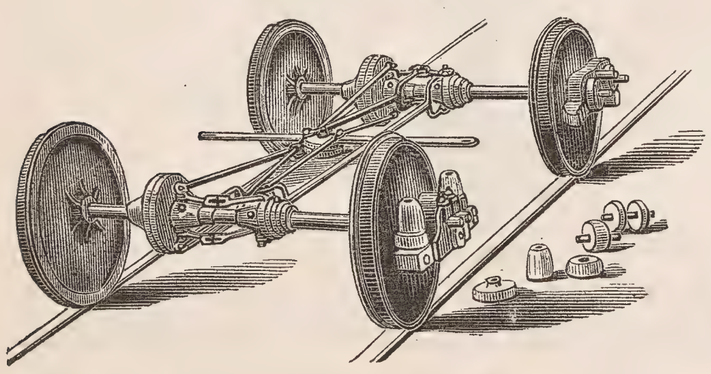

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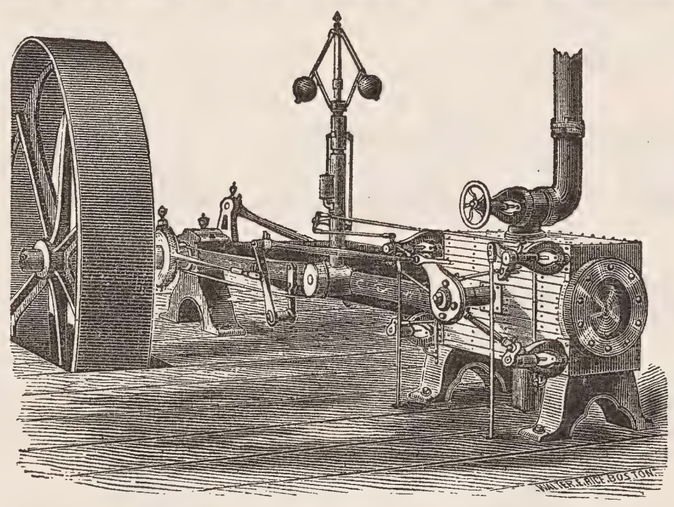

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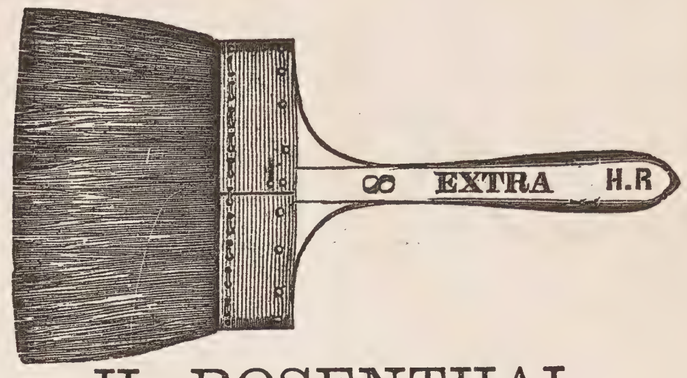

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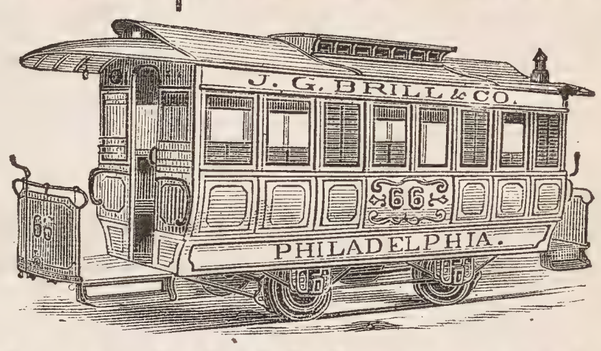

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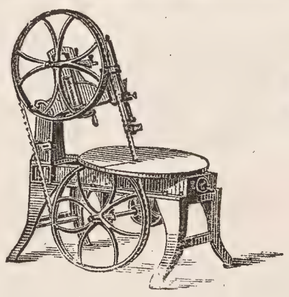

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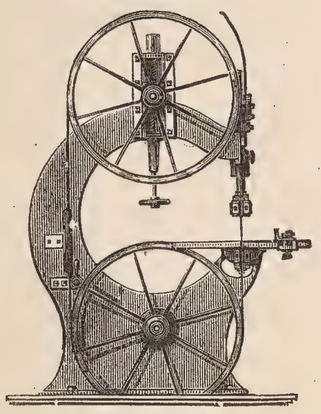

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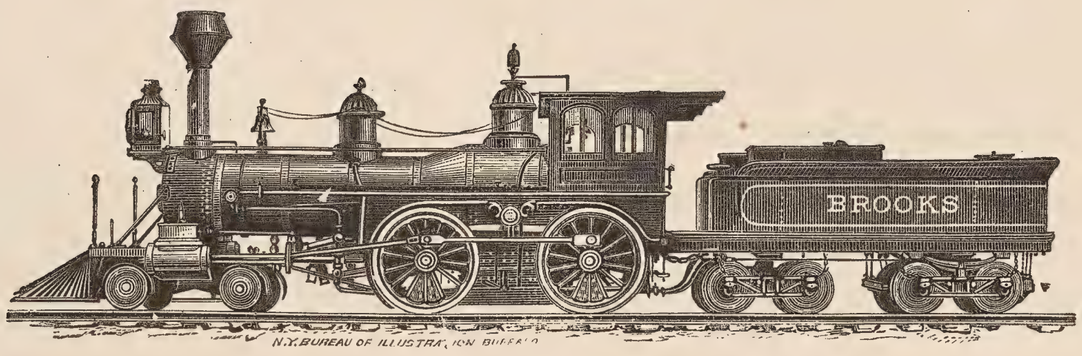

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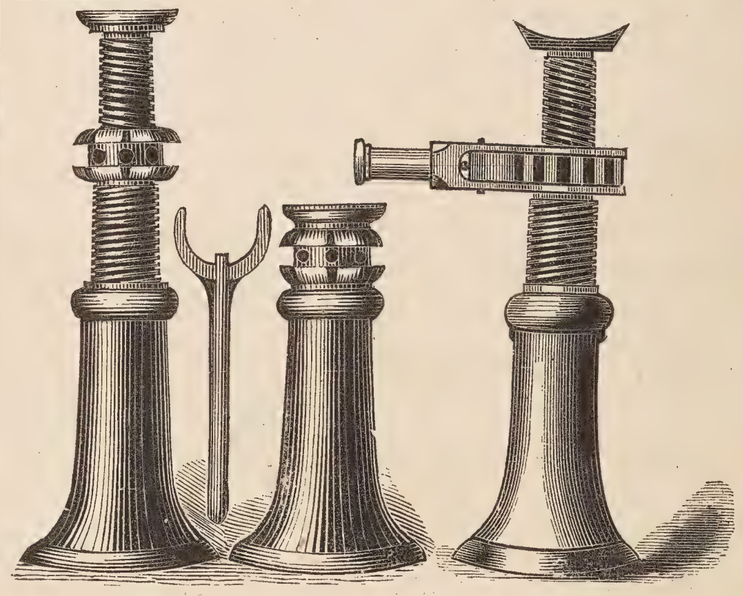

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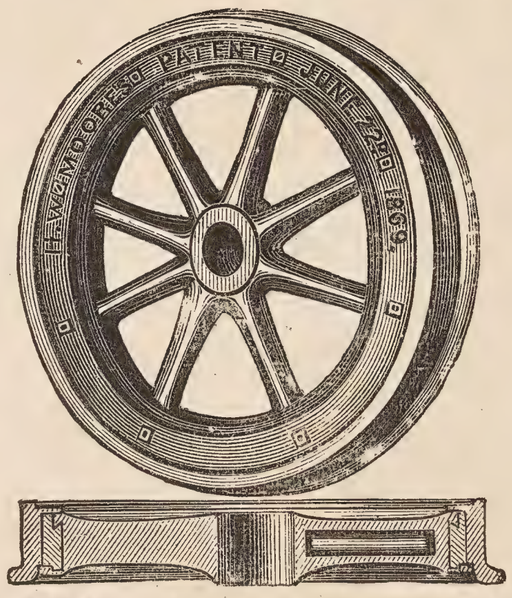

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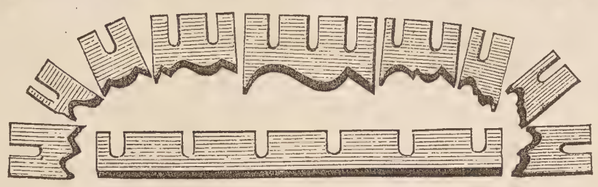

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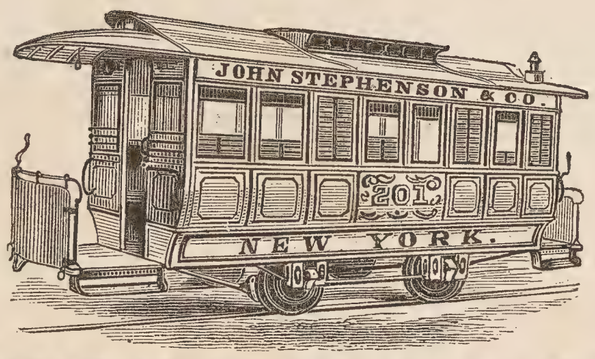

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Railway Machinery and Supplies.

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ITALIAN AND FRENCH WALNUT VENEERS,

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Butternut and Black Walnut Burls, Corrugated Ash and Black Walnut, Amboine, Thuya, Tulip, etc.

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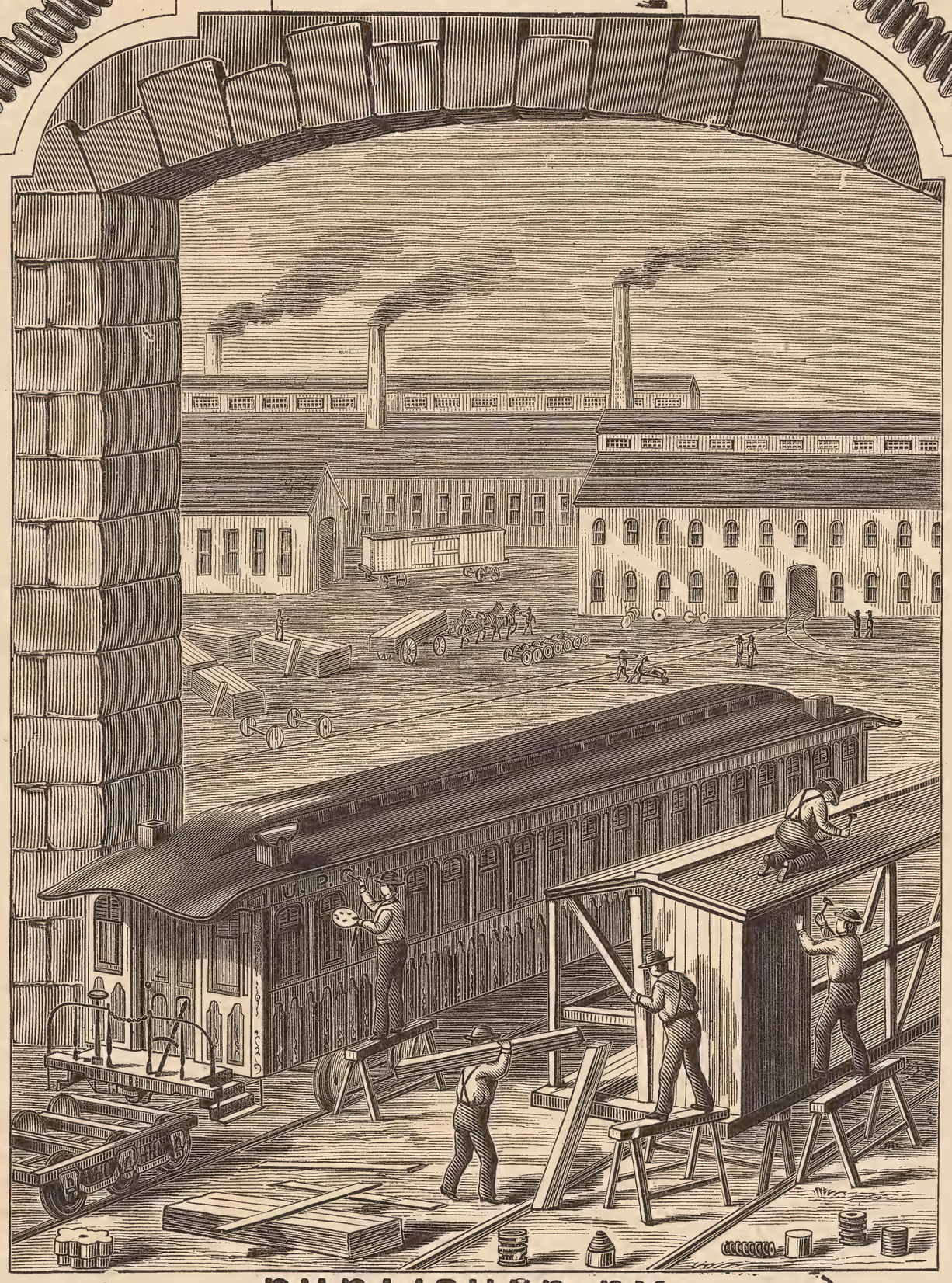
Vol. IV. MAY, 1873. No. 5



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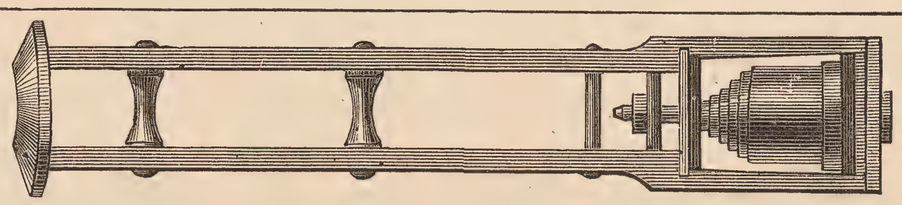

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OF

RAILWAY VARNISHES.

LAWSON VALENTINE.
HENRY C. VALENTINE.

MAY 1, 1873.

OFFICE: NEW-YORK.
FACTORY: BROOKLYN.

FINISHING.

FREQUENT WASHING WITH COLD WATER WILL IMPROVE ITS LUSTRE AND HASTEN ITS HARDENING.

		PER GALLON.
Railway Body Varnish, ... *(For finishing-coats on outside of Cars.)*	This Varnish differs from the Finishing Body Varnish used on carriages, in hardening free from tack more quickly, thereby rendering it more effectual in resisting cinders and dust. It is very pale, and dries out of the way of dust in about twelve hours. In working, fulness, lustre, and durability, it is unsurpassed. On old work, one, or at the most, two coats are sufficient. On new work, it is economy to use two or more coats over our **Hard Drying Body.**	**$5 50**

RUBBING.

Hard Drying Body Varnish, . *(For under-coats outside, and finishing inside, also for finishing Locomotives.*	This Varnish dries in eight to ten hours, and hardens so as to rub well in about four days. It is fully equal to our **Railway Body** in paleness, fulness, and lustre, and is much used for finishing over a leveled surface on hurried work not requiring the greatest durability. For best inside work it is particularly adapted.	**5 00**
Quick Leveling Varnish, . . . *(For under-coats on Locomotives and inside work, or for quickening the Hard Drying Body and Railway Body.*	This Varnish dries quicker and harder than our **Hard Drying Body.** In good weather it will harden so as to rub well in two days without sweating out. It is sufficiently pale for any light work. On outside work it should be protected with our **Railway Body.**	**4 00**

MISCELLANEOUS.

No. 1 Black Varnish, ... *(For smoke-stacks and other iron work.)*	This is an Elastic Black Varnish for Smoke-stacks. It dries and wears well. A little **Railway Body** mixed with it will improve it in lustre and durability.	**1 50**
Japan Gold-Size, ... *(For binding, drying, and hardening colors.)*	This is a superior oil-drier, of light color, and strength nearly double that of ordinary Japan. On account of its paleness and the less quantity required, it is especially valuable for use with light paints, and being an oil-drier it is much less hurtful to the work than Japan. Once known, it is indispensable to Car-Painters, for binding colors, mixing roughstuffs, and facilitating their drying and hardening through.	**3 50**
Crown Coach Japan, ... *(For drying and hardening paints.)*	This is a light-colored, strong-drying shellac Japan, for hardening colors, and is well adapted to the use of the car-painter.	**1 75**
Ground Roughstuff, ... *(For producing a hard and level surface on bodies of Cars.)*	This is a mixture of mineral substances, combined with great care so as to furnish a dense body with a sharp grit. It is ground in **Japan Gold-Size,** and is superior to all other roughstuffs, (sometimes erroneously called "fillings.") When used over a priming of one coat of **Permanent Wood-Filling,** the first coat should be made elastic with raw oil, and the following coats reduced with turpentine, if required for working.	**3 00**
Dark Permanent Wood-Filling, *(A patent article for priming outside work, and permanently filling and darkening natural woods.)* **Light Permanent Wood-Filling,** *(Precisely same article as above, but being light colored it fills without staining the natural wood, and is specially adapted to priming Cars.)*	This article, being a very penetrating and non-evaporating anti-damp of extreme durability, is a perfect and permanent filling for the pores of wood. Experience has proved that it will not only support the color and varnish better and longer than the old method of lead priming, but that on account of its permanent elasticity, it will neither crack nor flake off; besides which, it saves time, labor, and cost, and is more convenient, cleanly, and healthful.	**4 00**

☞ **Goods put up in 45-gallon barrels and 5-gallon sealed cans, cased, with no charge for packages. All goods in barrels 20 cents per gallon less, with 5 per cent. off for cash in 30 days.**

We claim that our ***Finishing Varnishes*** are unsurpassed in the following qualities:

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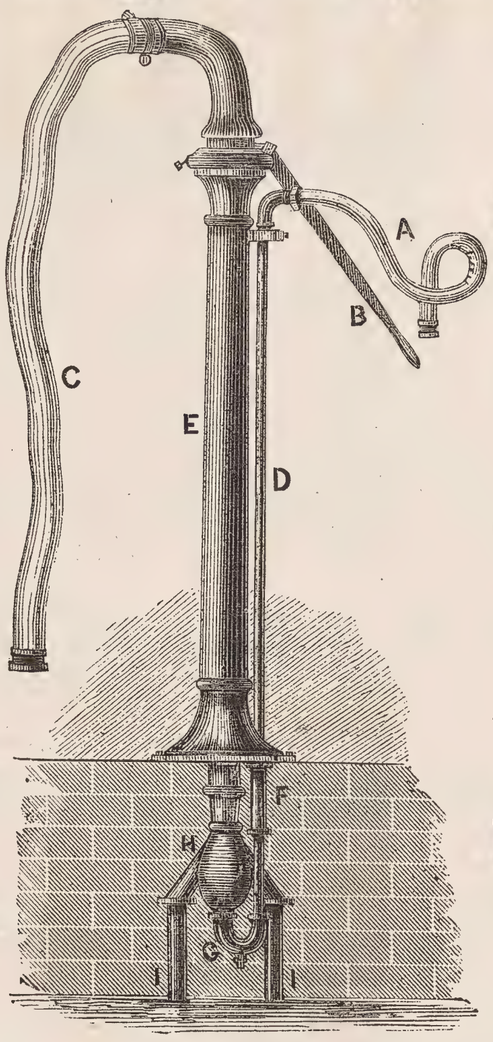
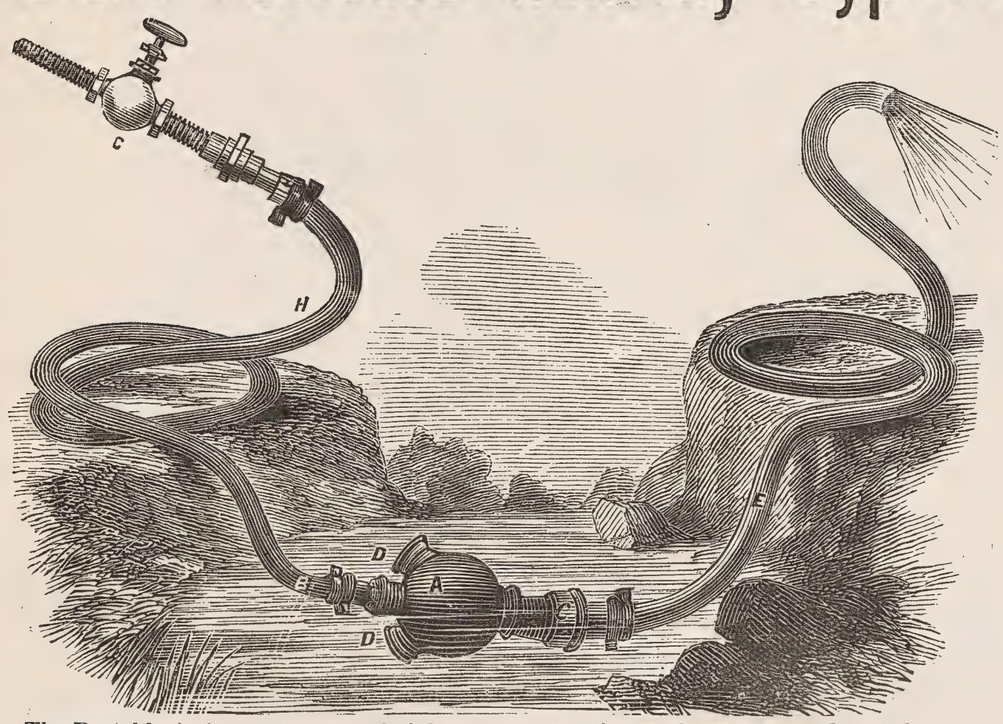


CAN NOT **FREEZE** IN ANY **CLIMATE,** UNDER ANY **CIRCUMSTANCES.** **Costs Less** THAN ONE HALF THE PRICE OF A **Frost Proof TANK.**

The Engineer in charge of the Locomotive attaches the Hose A to a steam valve in the boiler. Steam passed through the pipe D and slip joint F into the globe H, producing a vacuum; the water is then lifted through the pipes I I and forced through the column E and hose C into the tender, filling any ordinary tender in about three minutes. When steam is shut off all the water in the pipes returns into the well, and any condensed steam passes off through the drip valve G, leaving nothing to freeze. The handle B serves to turn the discharge pipe and hose in any direction. The water delivered into the tender is warm, thus utilizing the steam used. The discharge tubes, represented above made of hose, can be made of iron if preferred.

LANSDELL'S
Patent Portable Railway Syphon.



The Portable is invaluable on a freight or construction train, being used to take water at points where there are no water stations. With it water can by taken from any point within one hundred feet of the track where there is water six inches or more in depth. The valve C is tapped into the locomotive boiler; steam is let on through the hose B; water is drawn through the orifices D D, and forced through the hose E into the tender, filling any tender with warm water in from six to twelve minutes.

Lansdell's Patent Steam Syphons, Double Suction, adopted by the United States Board of Supervisors, and approved by the Secretary of the Treasury for use on Steamboats.

For Price and particulars, apply to the General Agents of the STEAM WATER STATION COMPANY,

LENG & OGDEN,

IRON AND STEEL DEALERS AND IMPORTERS,

4 FLETCHER STREET, NEW-YORK,

Sole Agents for Credenda Steel Gun Barrels and Moulds, and the Cold Drawn Patent Weldless Steel Tubes.

Noyes' Patent Liquid Packing

FOR COOLING AND LUBRICATING

Railroad Car and Steamboat Journals of all kinds.

The attention of Railroad men, as well as all others who are running heavy journals is respectfully invited to the above Liquid Cooler. It has been successfully introduced on several Railroads, and is constantly growing in favor as its merits become known, and we are confident that practical men can not fail of being convinced that our preparation deserves their candid attention. What we claim for it is:

That it will cool a journal while a car is in motion, and that its use will in a great measure prevent its occurrence, saving expense, delays, and accidents; that mixed with mineral oil it gives a soft heavy body, essential elements which this oil lacks, especially in warm weather, besides keeping it sweet and preventing oxydation; that a journal will wear longer and with less friction, and be better and more thoroughly oiled; that the heat from the journal is thrown off at a temperature below that required to melt the babbitt, saving it from being destroyed, and preventing an accumulation of heat; that there is less liability of waste packing of journal getting on fire, as the non-inflammable elements of the Liquid permeates the waste and prevents it; that it will cause a considerable saving in the expense of oiling, as it imparts additional lubricating qualities, as well as body which prevents waste from running off, keeps the journal smooth and polished, and hardens the bearings; that a trial will satisfactorily demonstrate its superiority to sperm or lard oil, and that used according to directions it is even cheaper than mineral oil, which is the lowest-priced lubricating oil in the market.

We do not claim the Liquid Packing as a *durable* lubricator of itself alone, but when used with good mineral oil according to directions, we do claim that it constitutes a cheaper, better, and more durable lubricator than any thing offered for the purpose under whatever name.

One thorough application of the Liquid on a hot journal will do more execution in cooling, than the constant application of water for half an hour, besides doing it evenly and without loss of time.

DIRECTIONS FOR USING.

FOR COOLING OFF A HOT JOURNAL WHEN CARS ARE IN MOTION.—For this purpose procure a can holding two gallons, the nozzle having an outlet of not less than half an inch, and always keep it well filled with the Liquid Packing for immediate use. When a hot journal is discovered, apply the Liquid slowly, first giving the contents of the can a thorough shaking, and then proceed. Examine journal at next station, and if not cooled down to a proper temperature, apply again, and so on until it is accomplished, then fill up the box with native lubricating oil; this is particularly necessary in all cases where animal oil is used as a lubricant. In all ordinary cases this treatment will effectually cool off a journal in a short time, and without causing scarcely any delay of train. *Where a box is on fire,* pour on the Liquid which will extinguish the fire immediately. In extreme cases, where the babbitt metal has melted, or where journals are extremely rough, the journal may become hot again. If so, repeat application of Liquid as directed, and then fill up box with native oil, and so on as often as may be necessary to the end of route. A can of the Liquid Packing, together with a can of native oil, will insure the safe delivery of cars troubled with hot journals, with scarcely any delay. A smoky and hazy emanation from boxes in which the Liquid is used, simply indicates a rough journal, and that the heat is being conveyed away from it. In such cases look to it occasionally, and keep it well supplied with the Liquid. Should the Liquid become too thick to run freely from the nozzle of can, from the action of the weather, thin to the required consistency with mineral oil.

FOR A GENERAL LUBRICATOR.—Add one part of Liquid Packing to two parts of native West-Virginia or paraffine oil, and use in regular way. Or, if preferred instead, use the Liquid Packing in every third or fourth oiling, according to the temperature of the weather and quality of oil. Used in this way, aside from its cooling qualities, it makes a lubricator that can not be excelled in price and quality.

WHAT RAILROAD MEN SAY OF IT.

MR. NOYES: FITCHBURG, MASS., Aug. 20, 1872.

Dear Sir: I have used your Liquid Packing for the past four months, and am perfectly well satisfied that it is the most effectual article ever in use for the purpose claimed. I have just ordered another barrel. If all railroad companies would adopt your Liquid Cooler, I think they would find a saving of nearly 20 per cent. when used with mineral or black oil according to your directions, JACOB MARSH, *Master Car-Builder Troy and Greenfield R. R.*

MR. P. NOYES: SALEM, MASS., Aug. 7, 1872.

Dear Sir: I have been using your Liquid Packing for cooling car journals, for some time past, and have been well pleased with it. I have had occasion to use it a number of times, under Pullman Cars, and it has been a complete remedy in every case of hot journals.

Every train should be provided with it, as it is a saving of time and expense in the running of trains, provided it is applied and cared for according to directions for using.

J. P. SOMERBY, *M. C. B. of Eastern Railroad.*

MR. P. NOYES, Agent: WORCESTER, MASS., July 11, 1872.

Dear Sir: Please send us another barrel of your Liquid Cooler. Have been experimenting with it for the past six months, and find it all you recommend. It can not fail of accomplishing the work, and with it and a can of native oil, can deliver my cars any where in good condition. I find, however, as you stated, that it will not work with amimal oil, but with mineral oil, and when used according to your directions it works entirely satisfactory. I shall take especial pains to pass its merits along. OSGOOD BRADLEY, *Car Manufacturer.*

MR. NOYES: OFFICE OF NORTHERN RAILROAD, CONCORD, N. H., May 26, 1872.

Dear Sir: Send to this corporation a barrel of your Liquid Packing. The sample package cooled four hot boxes within a distance of eight miles. I shall have a can on board each train, for it gives perfect satisfaction. A. LANGMAID.

P. NOYES, Esq.: ALBANY, Nov. 1, 1872.

Dear Sir: I received the barrel of Liquid Packing you sent me for trial, and gave it out to our most experienced conductors to use according to directions. Below please find their report:

We, the undersigned, Freight Conductors on the Eastern Division of the N. Y. C. & H. R. R.R., have used the Liquid Packing furnished by Mr. Jones, and find that when we arrive at a station with a hot journal, the Liquid Packing cools it sufficiently by the time we arrive at the next station to use the Black Oil, and then have no trouble in getting through with it. It is the best we ever used. R. H. FISHER, A. W. GETMANS, R. H. HEATH, WM. HESS, Conductors E. DIV. N. Y. C. R. R.; I. FERGUSON, Conductor H. R. R.R.

JOSEPH JONES, *M. M. N. Y. C. & H. R. R. R., E. Div.*

BELT AND LEATHER STUFFING CO.: NEW-YORK, PROVIDENCE, AND BOSTON R. R. CO., PROVIDENCE, Aug. 3, 1870.

Gentlemen: Some two months since I received from you a can (1½ galls.) of your Liquid Packing for cooling Journal Bearings on cars; I had just repaired and put to running an engine; the first trip the truck boxes (all new) heated badly. I gave the Liquid Packing to the engineer and instructed him to use it according to directions. The consequence was that we had no more hot truck boxes. I was so well satisfied with it that I ordered a barrel, and for the past month, when we have a hot box on any of our cars, we apply at once your Liquid Packing, which has in all cases, thus far, cooled the journal so as to give no further trouble or delay. During the past two weeks we have received from the Taunton Car Co. four new passenger cars; the two first when received by us from Taunton had each journal VERY HOT, with the babbitt metal melted out of brass shells, I renewed the metals and packed them with your Liquid Packing. The cars have been running 150 miles each day ever since, WITH NO MORE HOT BOXES. Some ten days since we received from the N. L. & N. H. R. R., at the Ferry Boat at Groton, (through express train from New-York to Boston, shore line,) a car having a red-hot box; your Packing was at once applied, cooling the journal so that the men were able in a few moments to put in a new metal; they then repacked with your Liquid Packing, according to your printed directions, and the car came into Providence, a distance of sixty-three miles, perfectly cool, without any further trouble. If it continues to work as well, I can not do without it. I cheerfully recommend it to all Railroads, as being an article which they will find invaluable in all cases of hot journals.

J. H. ANDERSON, *Master Mechanic.*

Send for a barrel. No charge unless it does all we state.

MANUFACTURED BY THE

BELT AND LEATHER STUFFING CO.,

47 INDIA STREET, BOSTON.

ALSO BELT DRESSING for preserving belts, and preventing them from slipping, and CABINET OIL TANKS for storing, drawing, and measuring oil, of all sizes.

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Machine-Forged Nuts,

BOLTS and NUTS,

WROUGHT WASHERS,

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139 Greenwich, Street,

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LOCOMOTIVE AND MACHINE WORKS.

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MANUFACTURERS OF

LOCOMOTIVES.

Narrow Gauge Locomotives a Specialty.

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AT CONNELLSVILLE, PENN.

Hitchcock Car Ventilator.

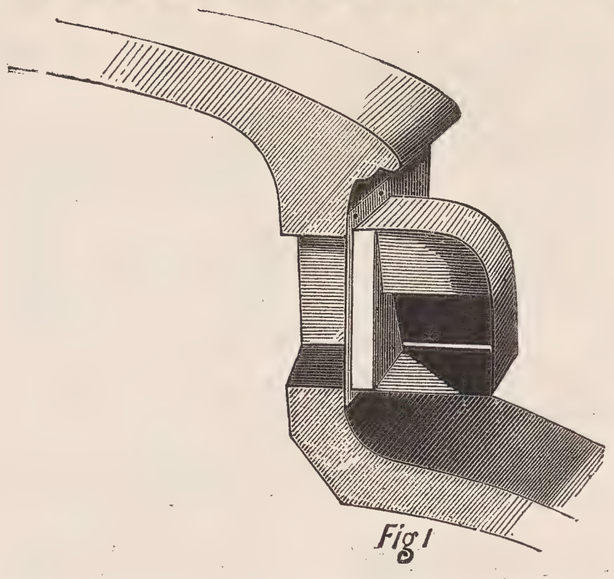

Fig 1

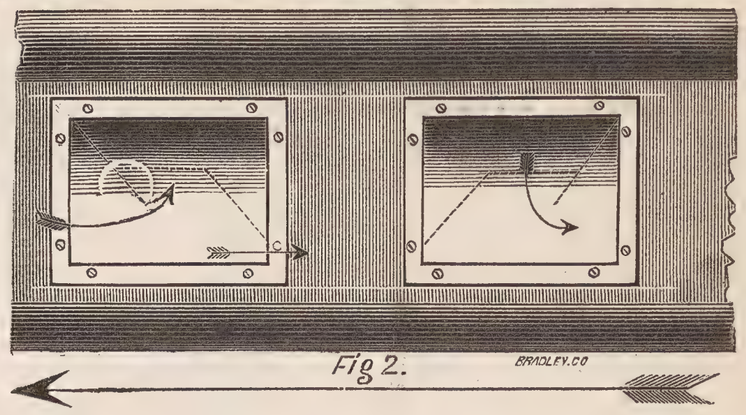

Fig 2.

THE Ventilators are placed as usual in the car roof as shown in Fig. 1, their mouths facing alternately in opposite directions, those facing forward admitting the air, and those facing backward affording an exit. Fig. 2 represents a side section of the raised roof with two of the ventilators alternately arranged. When the car is moving in the direction indicated by the arrow, it will be seen, by the curved darts, that there is an ingress and egress of air constantly taking place. The operation of the ventilators is reversed with precisely the same effect, when the car moves in the opposite direction. The internal structure is such that the dust and cinders passing into the mouth of the ventilator are intercepted by striking against two shields, shown in Fig. 1, and indicated by dotted lines in Fig. 2, and are thus naturally thrown to the bottom, where they are carried out through a small opening as shown in Fig. 1, and by the straight dart in Fig. 2, a current of pure air being forced into the car at the same time through a lateral opening. The faster the car moves, the greater is the quantity of air admitted and expelled, thus securing a free circulation which does not subject the occupants to a direct current or draught. The ventilator is also noiseless in its operation. There is no clattering of valves, and no change is necessary when the car reaches its destination. Once put in place, it is always in readiness, and runs itself independent of all employees.

H. D. CARROLL & CO., Springfield, Mass.,

Proprietors and Manufacturers.

ROBERT HITCHCOCK, Inventor.

MILLER'S TRUSSED PLATFORMS. Compression Buffers and Automatic Couplers for Railroad Passenger Cars.

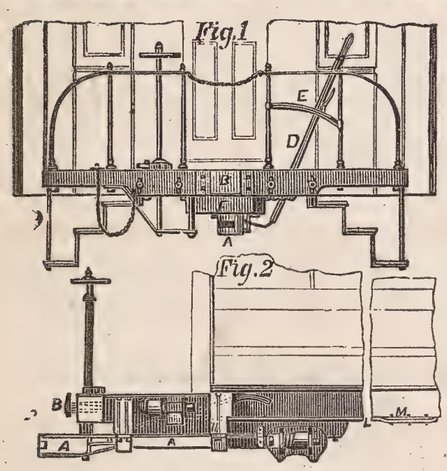

Fig.1

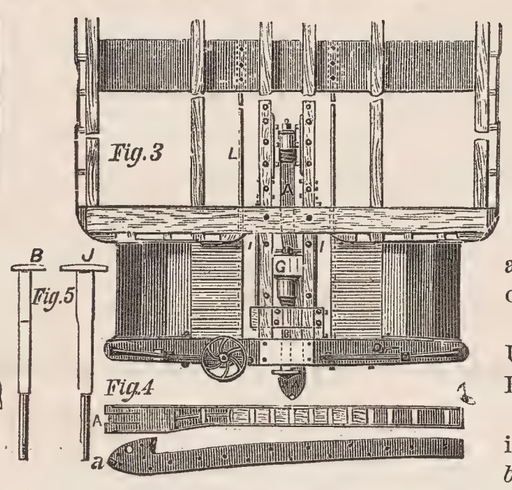

Fig.2

Fig.5

Fig.3

Fig.4

Office, 231 Broadway, (Rooms 4 and 5,) New-York.

Send for Illustrated Pamphlet, and call and see working models. E. MILLER, Patentee

DESCRIPTION.

Figure 1 is an elevation; Figure 2, a longitudinal section; Figure 3, a plan of an end of a car to which the arrangement has been applied; and Figures 4 and 5 show top and side views of the "Hook" and "Buffer," drawn on a larger scale than that of Figures 1, 2, and 3.

The letters refer to the same parts in all the figures. A is the coupling "Hook," B the "Buffer," C the "Stop," D the "Lever," E the "Quadrant Ratchet," F the "Truss Beam," G the "Spring Beam," H the "Suspender Beam," I the "Upward Trusses," K the "Main Spring," L the "Downward Trusses," and M the "Bolster."

The Platforms, instead of being located below the centre line of the main sills of the cars, are placed *in* that ine, and held there by the Trusses I and L, so that the point of contact (in Buffers B) is *in* the said centre line and *not below* it.

The coupling "Hook" A is attached to the draw spring the same as the ordinary draw head, and at the same height above the track, but in such a manner that the outer end is free to move laterally for a short distance. The Coupling Hook projects beyond the platform. The Stop C is placed under the Buffer Beam to prevent accidental uncoupling. When two cars are brought together, the Coupling Hooks, from *their shape*, push each other aside, until the Buffers B are compressed hard on the Buffer Springs, then—*the points of the hooks having passed each other sufficiently far*—the Hooks are carried forward by their main-springs, and thus the "*Coupling*" and "*Compression*" are both effected automatically *and at the same time*, and without the use of links and pins. When two cars are thus coupled together, the *head* of the *Hook* of each car is under the Buffer Beam of its opposite car, and the platforms are close together, (about 4 inches apart.) The effect of this is, *one platform can not be forced over the other*, nor can a *child* fall between the platforms; the dust and rain are nearly all shut out; the "Compression" makes the train run steadily, and prevents all jerking at starting and stopping.

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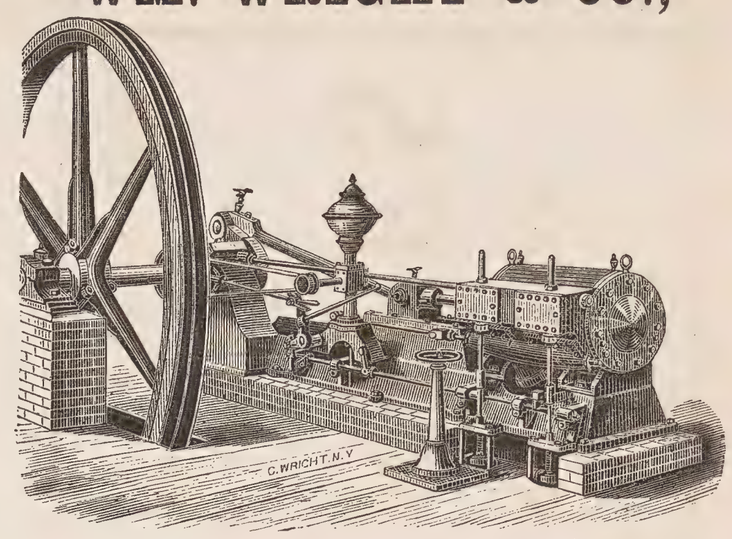

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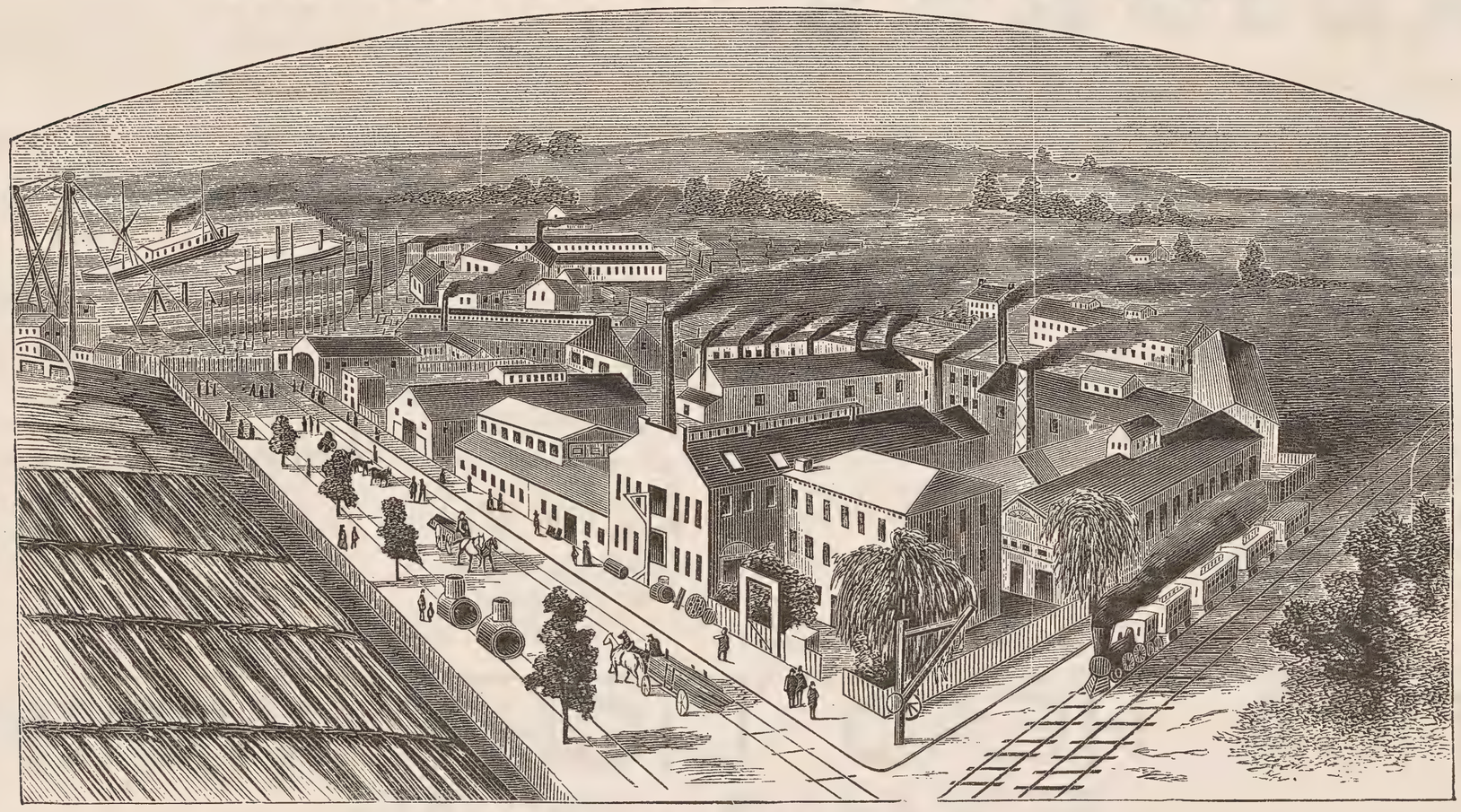

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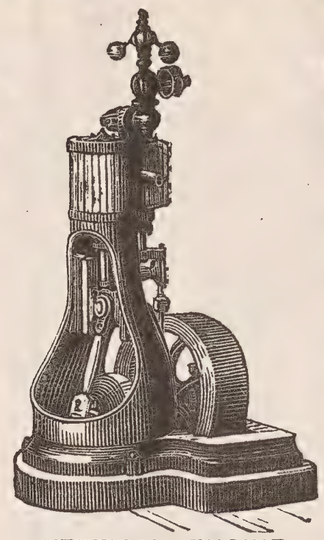

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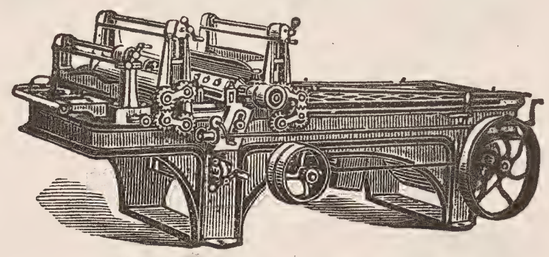

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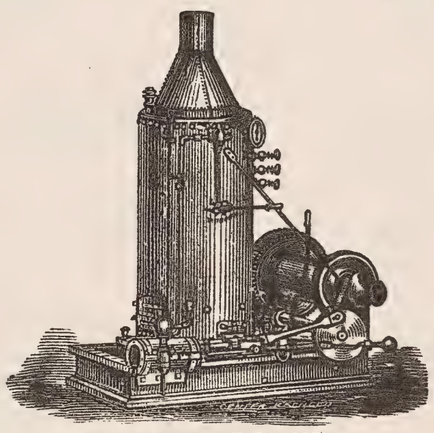

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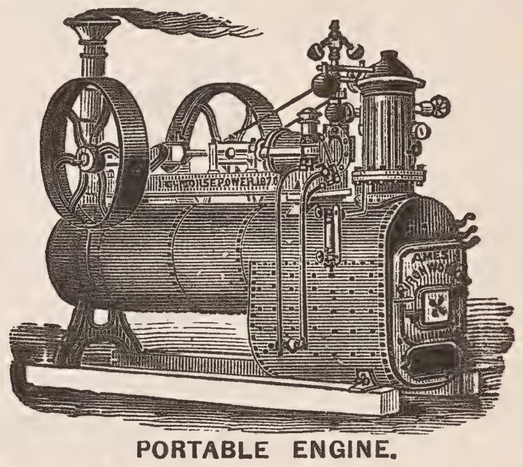

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Vol. IV. No. 5. | MAY, 1873 | One Dollar per Annum. Single Copies, 10 Cents.

Steel and Iron Rails.

A CORRESPONDENT of the Chicago *Tribune* makes the following remarks in regard to the comparative merits of steel and iron rails, expressing the belief that the former are not at all necessary, provided a good quality of iron rail could be obtained:

"Mr. Sandberg, a Swedish engineer, resident in London, who has given this subject much close attention, declares that, 'Although a good steel rail is generally thrice as strong as iron, when punched, or the flange is cracked, the iron may be the stronger. The steel is made as soft as possible, . . . for not by hardness, but by homogeneity, is it superior to iron.' This last assertion is well known to be true. Rails, as at present made, are at first rolled into slabs as wide and thick as the hand, and long enough, when six of these are piled together, to make the rail of any desired length. These are then wired together into a 'faggot,' heated over, and rolled into a rail. This last heating generally injures the iron very much. It seldom or never becomes properly welded together, and each slab soon scales and laminates by itself into those long splinters which may be seen on any well-worn track. This was not the case with rails first used, which were rolled, solid and 'homogeneous,' alike all through, out of a 'bloom' of iron. Old-fashioned rails, that had been used twelve to fifteen years on a Western road, on being sent to a modern rail-mill to be re-rolled, came back in such a condition that they were used up, on the same road, in less than a year. A few years ago, Mr. Blackstone, chief engineer of the Alleghany Valley Road, at Pittsburg, had a dozen rails rolled in the old-fashioned way and placed in the most used part of his track. At the last accounts they had outworn several sets of common rails on the other side, and were as good as ever. This would seem to indicate that it is not steel rails that are needed so much as a good quality of iron, and a cessation of the present objectionable mode of rolling iron rails. It ought to be forbidden by statute, if it can be stopped in no other way.

"The rail, which ought to be the most honest part of a railroad, since so many lives depend upon it, is generally the object of as much jobbery as any part of it. When roads are being built, and are poor, any rails are taken that can be bought with bonds. Afterward, when they get rich, influential jobbers demand this as their perquisite, and give as little for the money they get as possible.

"The statistics of good iron rails show that, for ordinary traffic, in this country or England, they ought to last ten years; near large cities, one third of that time. The life of a steel rail is about six times that of piled iron. It is very doubtful if the present quality of steel furnished for rails is as good as a fair sample of iron, such as was generally used twenty years ago. On the Metropolitan London Railroad, with the greatest traffic in the world, Sandberg says that steel endures three to four years, where the common laminated iron rail will give out in six months. Steel rails just now rage like a new-fashioned bonnet, and are put forth as a panacea for all the ills railways are heirs to. When they were first offered, nobody would look at them, and only years of persistent effort succeeded in bringing them to notice.

"Duplex rails and axles have been highly extolled by many engineers. The success of the Miltimore compound axle has largely tended to bring these again into general attention. In cases where so much depends on the integrity of the metal, it is asking too much to depend upon a single piece, in which there may be a fatal yet imperceptible fracture, till it absolutely breaks down. Several patterns or sections of rails have been invented, in which one piece of iron is placed above another, in such a way that the lower one is completely protected from the blows of train-wheels. When the upper layer is worn out, it may be taken off and replaced, without disturbing the lower part. In case of one piece being broken, the other remains good. It is also estimated that, while the head portion may give out in a few years, the base part may remain good for twenty or more years. It would certainly seem unnecessary to take up a whole rail, and burn and roll it over, to repair the injury which occurs only on the first or upper inch. This subject is certainly worth more attention and encouragement than railway managers have yet given it."

A New Air-Brake.

THE St. Louis *Railway Register* contains the following description of the Gardner-Ransom air-brake, for the manufacture of which a joint-stock company has been organized at Cleveland, Ohio, and an extensive establishment fitted up for the purpose:

It is claimed by the inventors that they have successfully remedied the acknowledged deficiencies of other power brakes, and have demonstrated the feasibility of controlling all the movements of a railway-train in any emergency, as well as in ordinary service, by steam and compressed air, applied from the locomotive and controlled by the engineer. The apparatus consists of a pump attached to the locomotive, an air-reservoir placed in the tender, an air-cylinder under each car, with the hose-pipe through which the air is forced. The following are the leading characteristics of the improvements:

1st. The pump is simple in its construction, certain in its action, easily understood and kept in repair by engineers of ordinary skill, and will pump one hundred pounds of air with one hundred and ten pounds of steam, or more if required.

2d The brake is both applied and released by compressed air, the action in either direction being instantaneous or gradual, as may be required. The improvement claimed over the Westinghouse brake is not only in setting the brake, but in forcing it off with the same rapidity and ease, each action being entirely under control of the engineer—very necessary in making a quick stop, and at once being able to release brakes and back out of danger. This advantage is obtained by means of a four-way cock and the air-cylinder under the car, the power which applies the brake by the reversing of the lever being turned back from the air-cylinder through the four-way cock in such a way as to "force off" the brake in the same manner as it is "set."

Mr. Gardner, the original inventor, was formerly an engineer on the Cleveland and Pittsburg Railroad, and while operating the Westinghouse brake discovered the method of remedying the defect in that brake. Mr. Ransom was also connected with the same road in the same shops at Cleveland, and by conferring together, they have succeeded in completing their brake, and for nine months have had it in operation upon the road with which they were connected.

The brake is now in use upon the Milwaukee and St. Paul Railway; the Detroit and Milwaukee Railroad; the Cleveland, Columbus, Cincinnati, and Indianapolis; and is being placed the present week upon the New-York Central, under the personal supervision of Mr. Buchanan, master mechanic, at New-York. The master mechanic of the Cleveland and Pittsburg Railroad says, in his report of the trial upon his road, that he finds a saving of one minute in making a stop of a train, by being at once able to release the brakes, instead of relying upon the waste cocks in the connecting-hose, or depending upon a spring alone to release a brake from a pressure of sixty to eighty pounds per square inch.

The company was incorporated in January last with a capital of $500,000. H. M. Claflen is president, and C. A. Brayton, secretary. Active preparations are being made for pushing the manufacture of the brake, and the company will in a short time be able to equip a train a day.

Narrow-Gauge Railways in Colorado.

A CORRESPONDENT of the Pittsburg *American Manufacturer*, writing from Denver, Col., gives the following information in regard to narrow-gauge railways in that State:

Thus far there are the following 3-foot gauge railway lines now in operation in Colorado. Denver and Rio Grande—Denver to Pueblo, 117 miles, Pueblo to Coal Banks, 38 miles; Union Pacific—Golden to Black Hawk, 21 miles; total, 176 miles. The following are in course of construction: Union Pacific—Forks to Georgetown, 22 miles; Denver, South-Fork, and Pacific—Denver to Fairplay, 95 miles; total, 117 miles. These railway enterprises reach the heart of the gold, silver, and coal districts, and the new South-Park or Mount Lincoln mines.

The Denver and Rio Grande Railway was built at a cost of $14,000 per mile, including equipment, stations snow-sheds, fences, ballasting, car and machine-shops, hotels, offices, and every appurtenance for business. The Kansas Pacific, passing through the same kind of country, and built by the same engineers and con

tractors, cost $22,000 per mile. The Golden and Black Hawk branch of the Union Pacific cost $20,000 per mile. The latter is through the most mountainous part of Colorado. The maximum grade was 175 feet, and the maximum curvation 26o. An estimate for building a 4-foot 8-inch road along the same route was $65,755 per mile, making a saving in favor of the 3-foot gauge of $47,290 per mile.

In the construction of the Denver and Rio Grande road, the width of the road-bed is 10 feet; at curves, 12 feet. The sharpest curve is 6°; maximum grade, 75 feet; length of ties, 6½ feet; slope of earth cuttings, 1 to 1; of banks, 1½ to 1, of which rock-cuttings ¼ to 1; weight of rails, 30 pounds per yard. The passenger-engines in service are four drivers connected and a pony truck, cylinder 9 inches diameter, stroke of piston 16 inches. Diameter of driving-wheels, 40 inches; diameter of pony-wheels, 24 inches; distance between driving-wheel centres, 6 feet 3 inches. Capacity of tender, 500 gallons; length of engine and tender, 35 feet 4 inches, weight of engine in working order, 25,300 pounds. They are the Baldwin make. The speed of passenger-trains per schedule is 15 miles per hour; freight-trains, 18. But after the passenger-trains have run 25 to 30 miles per hour, there has never been a serious accident on the Denver and Rio Grande Railway. The worst case occurred recently, when a hurricane took a coach from the track, the train running at full speed the while. The Miller coupling allowed the car to become at once detached, instead of being dragged along, and nobody was seriously hurt.

The narrow-gauge passenger-cars stand thirteen inches nearer the rail, and have about fifteen inches less overhang at the side, hence the centre of gravity is considerably lower than on the standard gauge, making the car ride very steady, and with less oscillating motion than is usually observable upon the wide gauge. The seats, thirty-six to a car, are arranged double on one side and single on the other, with the order reversed midway of the car, to distribute the weight equally. The freight-cars at first in use on the Denver and Rio Grande Railway were about half the length of the ordinary car, but these are being disused and cars made at the company's shops in West Denver, which are nearly the length of the broad-gauge cars, and carry eight tons each; these are found to keep the track better, and to be safer than the shorter car. The coal-cars carry eight tons; and an engine will haul 20 of them over a steep grade.

From the first month of its operation the Denver and Rio Grande road may be said to have been on a paying basis. Its operating expenses are less than two thirds those of a broad-gauge line, while its carrying capacity is over three fourths. While it is to be remembered that from terminus to terminus, along the line, there is not a resident population of over 1000 inhabitants, and at the termini not over 18,000, with all productive industries in their infancy, the following statement of earnings will show well:

1872.	Earnings. Freight.	Passengers.
January	$5,239 95	4,753 74
February	7,736 09	5,582 33
March	8,951 78	5,425 34
April	10,461 71	6,775 72
May	14,677 27	10,442 97
June	16,858 65	11,022 73
July	13,426 69	15,186 55
August	17,016 48	17,021 78
September	16,488 32	16,308 16
October	17,554 90	14,658 63
November	22,490 32	14,785 95
December	22,000 00	12,000 00

As the country tributary to the Denver and Rio Grande road is a cattle region of some note, stock-cars are being constructed with 4 Wheeler trucks, 24 feet long. They carry 9 head per car; the broad-gauge car carries 14 head. But the total weight per head stands as follows: wide-gauge, 1285 pounds; narrow-gauge, 888 pounds; difference in favor of narrow-gauge, 397 pounds, or one and three fourths tons per car-load of 9 head.

As to liability to obstruction from snow, it may be said that there has been no snow in this latitude the past winter to test this. But the previous winter furnished a good test. Seventy-six miles of the road were in operation. The divide, over which the road passes, is visited by deeper snows and worse drifting than any other part of Colorado, and so it was then. But in no instance were trains delayed above a few hours, chiseling or tunneling their way through drifts with wonderful readiness, and without the breakage or slipping from the track so common to the broad gauge at such times. And while the Denver and Rio Grande was enduring this experiment, the Kansas Pacific and Union Pacific trains were being detained days at a time by much less serious storms.

Pullman Cars in England.

THE Chicago *Tribune* contains the following in regard to a contract made by the Pullman Palace-Car Company with the Midland Railway of England, for the purpose of supplying the latter with Pullman coaches:

The Midland Railway Company is one of the leading railway corporations of Great Britain. It now operates 900 miles of road, and will soon operate 1300 miles, having its northern termini at Edinburgh and Glasgow, and lateral lines touching every important city in England. The action that it has taken in regard to the American railway system can not fail, therefore, to be attended with very important results. The railway system of England is familiar to the tourist, but not to the untraveled Yankee. The common English railway coach is 28 feet in length, and divided into four compartments, entered at the side. They are not remarkable for any great elegance of finish, although the first-class coaches are handsomely upholstered. They are supported upon four wheels, which, unlike the car-trucks used on American railroads, are unyielding and rigid at curves in the track. On new American railroads, such an arrangement of wheels could not be used at all. Luggage is carried in "vans" made for the purpose, and on the tops of the coaches, and never checked as in America. When passengers reach their destinations, ladies and gentlemen must attend personally to selecting their baggage, thereby causing, as compared with the admirable system of checking in this country, much trouble and annoyance.

The contract of Mr. Pullman with the Midland Railway Company is for the term of fifteen years, corresponding with his agreements made with the railroads of the United States, and will doubtless lead to radical changes in the present system of passenger travel on the English railways. The Pullman Company have already commenced the construction of eighteen cars at their works in Detroit, which are to be shipped to England and put upon the Midland Railway in September next.

They will be of the most elegant description; will be 50 feet in length, and have all the recent improvements of the Pullman system. The day-coaches will have three first-class and four second-class compartments, and will be placed upon the American truck, as will also the baggage-cars, which will be 45 feet long, and contain, in addition to a baggage-room in either end, four compartments for third-class passengers. The American check system for baggage will also be adopted. These trains will be equipped with Miller platforms and either air or magnetic brakes, and, as in all American cars, the entrance will be at the ends instead of at the sides, as in the present English coach. There will be two trains each way between London and Liverpool, American in all respects, except the retention of the compartment system on day-coaches, third-class travel, and a few other unimportant details. In consequence of the size of the tunnels and bridges on English railways, it is necessary to make the new cars about 6 inches lower and 8 inches narrower than those used in this country—a change so slight as not to affect the style or comfort of the Pullman car. The terms of running the cars are the same as in America. The Pullman Company furnishes the cars fully equipped, with attendants, and derives its compensation by a charge to passengers for the extra accommodations which they provide.

The Railway Company collect their usual rates of fare, and as compensation for the use of the Pullman cars, keep them in repair, except as to upholstery and bedding.

The above facts were obtained from Mr. Pullman. Of the paragraph which has been circulated throughout the country, in regard to a sleeping-car already started on some English line, he says that nothing of the kind has really been done. The English railways have long had a saloon carriage designed to accommodate parties of eight persons when specially chartered. The sleeping-car referred to is of this class, with the addition of an arrangement of chairs, which may be made into six beds at night. This is the nearest approach to a sleeping-car now used in England, and even this was not being used except for occasional trips.

The example set by the Midland Company can not fail to be speedily followed by the other great railway corporations of Europe. One of the important results of the introduction of the Pullman cars into England is likely to be an increase of foreign travel in America, when it is thus practically demonstrated to the English public with how little fatigue great distances can be traversed.

Mr. Pullman also stated that, in view of his arrangements in England, which necessitated the construction and shipment abroad of so many cars designed for actual service, he has decided not to send any to the Vienna Exposition.

The Cleveland Bridge and Car-Works.

THESE works, of which the McNairy and Claflen Manufacturing Company are the proprietors, employ a force of about 550 men in the construction of street and steam railway passenger-cars, freight-cars, iron roofs, turn and transfer-tables, Post's patent Howe truss, and other kinds of bridges for railways and turnpikes. Few establishments in the country are better fitted for turning out a given quantity of work in a short space of time. The works cover an area of nearly five acres, and have grown to this magnitude within a few years by a steadily increasing business, individual energy and fair dealing. This space is becoming too contracted, however, for the extensive operations carried on, involving an annual consumption of 8000 tons of pig-iron, 5000 tons of wrought-iron, and 3000 tons of coal. During last year, the works erected about fifty iron bridges, the principal one of which spans the river at Mobile, and is 2300 feet long. The others are distributed among twelve different States, and give uniform satisfaction to contractors and the public. This year they will erect a bridge across the Detroit River for the Canada Southern Railway, of about the same length as that in Alabama, with a draw of 342 feet. This bridge will contain over 400 tons of iron. The various parts are fitted to place in the factory, then carefully marked, disconnected, and sent forward to the place of destination in the order in which they are to go into the work.

In addition to the building of bridges, the company are now manufacturing at the rate of seven freight-cars a day on a contract with the Cleveland and Pittsburg Railway Company for 100 of this class of rolling stock. They are also completing a very elegant sleeping-car for the Cleveland, Columbus, and Cincinnati Railway. They last year built for Commodore Vanderbilt's New-York Central line 450 box and oil-cars, 600 box and 300 coal-cars for the United States Rolling-Stock Company, besides some 500 cars for other roads. They own the Higley patent journal, the merit of which consists in substituting a spherical for a straight bearing, thus so vastly decreasing the friction that a weight requiring the united power of eight men to move it upon the ordinary bearing can be easily moved by two men. It is, in fact, the application of the friction-roller upon a multiplied scale, and presents a self-evident advantage over any device yet

applied to revolving bodies. This they apply largely in the construction of street-cars, which they ship to all parts of the country. They have also availed themselves of another patent evidently of great value —Beach's process for seasoning timber by means of steam—a process which reduces to hours the work of weeks by any known application for seasoning lumber by either artificial or natural means. There is no establishment in Cleveland which has contributed more to the substantial prosperity of the city, and none, however prosperous, which has done more for the good name and fame of the city abroad.—*Cleveland Paper.*

The Cumming Nut-Lock.

A BRIEF description of this invention was embodied in the notice of the car-builders' monthly meeting contained in our last issue, and we now give a more detailed description of it, accompanied with illustrations which will enable the reader to understand very clearly its character and application.

Fig. 1 represents the lock-nut and bolt in sectional view. The bolts and nuts are made in precisely the same way as ordinary bolts and nuts, and then a slot

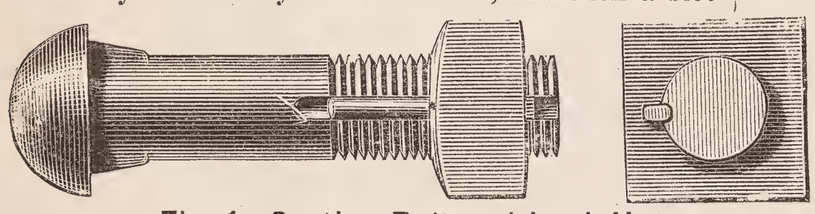


Fig. 1.—Section Bolt and Lock-Nut.

is cut by a machine lengthwise through the threads of the bolt. In this slot is inserted a short piece of soft metal wire, (copper or brass,) so that a hair's-breadth of the thickness of the wire projects beyond the slot. The nut is then screwed up, cutting its way on the projecting wire, and when as tight as desired, it is secured by riveting the outer end of the wire, which is done by two or three blows of a hammer upon the riveting punch, (Fig. 2,) which is used in the following manner: after the nut is screwed to position, *over* the copper key, insert the point A under the outer

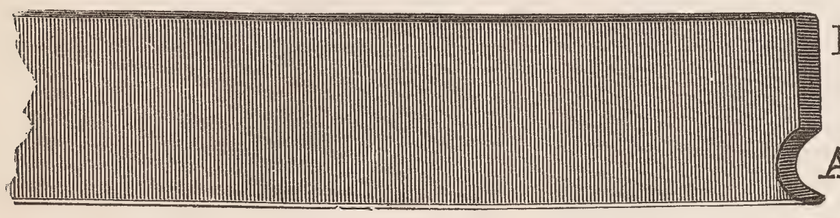


Fig. 2.—Set-Punch for Riveting Keys.

end of key, and by a blow of hammer start the key out of slot; then use the flat end B to rivet the end of key solidly against the outer face of the nut. The nut thus becomes absolutely immovable, no matter how strong the vibratory motion to which it is subjected may be.

It is applicable to any bolt, old or new, of any size or form, in any position; and while firmly locking the nut to the bolt, yet can be readily adjusted or removed with a wrench.

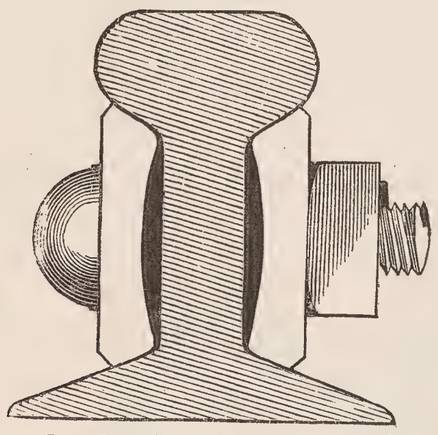


Fig. 3.—Application to Fish-Joint

Fig. 3 shows the lock-nut used on a fish-joint, in which position it plays a most important part.

Of the practical value of this invention we entertain a very favorable opinion. That it is very effective in preventing the loss of nuts in the working of machinery, and especially in the running of railway trains, has been demonstrated by the experience of numerous roads, and by its use in mills and factories where it has been satisfactorily tested, The loss of nuts from railway rolling-stock of every class is a chronic difficulty with which all railway men are familiar. It may, we think, be safely estimated that an ordinary passenger-car will shed at least 500 nuts a year, and coal and freight-cars about one third of this number. Reckoning the value of them at three cents each, would make a loss of $15 a year on passenger-cars, and $5 a year on coal and freight-cars. The aggregate loss on the total equipment of a road, will upon this basis, reach a pretty high figure; and this figure will also represent the aggregate saving which would result from the use of any device to prevent such loss. To this saving in the naked value of the nuts is to be added the diminished wear and tear and less liability to accident. The application of the lock-nut also dispenses with the use of check-nuts, which is another important saving which railroad men can readily estimate and appreciate.

The bolts, or shop-rights to use them, can be procured at the office of the Lock-Nut and Bolt Company, 61 Broadway; also licenses to apply the device to ordinary bolts, and a cheap and simple machine for cutting the groove. The charge for royalty is $2 per car.

Items of Railway History.

THE ancient Romans, with their wonderful ability for overcoming natural obstacles, made an approach to the invention of railways in the Appian Way, which was formed of large blocks of stone fitting closely together, whose surface presented a smooth and hard track for the wheels. It was not, however, until 1676, at the collieries near Newcastle-upon-Tyne, England, that rails were first applied for railway purposes, at which time the word railway first came into use. At that time, rails were laid along a roadway by the river-bank, by which means one horse was enabled to draw five coal-cars, a feat which then seemed marvelous. For many years, this principle obtained little recognition beyond the narrow limits of this coal valley, and it was not until about the year 1765 that such changes were made in the construction of the track as gave it substantially the principal features of those of existing railroads. In 1767, some iron-mine proprietors, whose pig-iron was so valueless that they could afford to make the experiment, caused some rails to be made of cast-iron, which were secured to the old wooden rails by means of spikes. With the invention of machinery for rolling malleable iron, this became substituted for the old rail, and has continued in essentially the same shape and substance to the present time.

The adoption of steam as a motive-power was not so early. Watts, in his first investigation of the properties and applications of steam, had suggested the possibility of steam locomotion; but it was left for an American, Mr. Oliver Evans, of Philadelphia, to reduce the theory to practice, which he did in 1782, by inventing and patenting a steam-wagon. From this time very rapid and important improvements were made, until the steam road-wagon has become a ponderous engine, weighing, in some instances, forty-eight tons.

In our own country, the earliest railroad was a horse-tramway, three miles in length, in Eastern Massachusetts; Pennsylvania next followed with the horse-railway from the Mauch Chunk coal-mines; and an extraordinary activity soon became developed in the other States. The system of granting charters, now accompanied by so much fraud and corruption, was inaugurated and successfully carried out in many States. In the summer of 1829, a little more than forty-eight years ago—one generation, within the memory of men yet young—the first locomotive was put in use in this country. It would occupy too much space to trace the rapid development of the railway system from Maine to Louisiana. They were introduced in all the older States, and within ten years, in 1832, there were sixty-seven railways in operation in Pennsylvania alone. In a very short time, the roads outstripped in length those of Great Britain, and have ever since far exceeded in numbers and extent those of other countries.—*Chicago Courier.*

Railway Passenger-Cars.—The Advantages and Defects of their Construction.

BY J. M. BLANCHARD.

THE relation between the weight of cars and the weight of the load carried in them is a hackneyed theme, but it is an important one, and one which has not received the attention which it demands. In what I may have to say upon this subject, I shall treat the cars as non-paying freight, and their load as paying freight, and my effort will be directed toward showing that the difference between the two is far greater than it should be, or than there is any necessity of its being. The weight of freight-cars varies so much that it is difficult to fix any actual standard of comparison between it and that of the load carried in them; but we will suppose, for the purposes of this article, that the average weight of such cars is 20,000 lbs., and that they are capable of carrying a load of 30,000 pounds, which will give us two thirds as much non paying freight as we have of paying freight; and hence it follows that if a ton of freight is apparently carried one mile for three cents, it is actually carried for a trifle more than one and one half cents, or, in other words, one and two third tons are carried for three cents. This statement, startling as it is, has often been presented to the public, but has failed, up to this time, to produce its desired effect; and it is to this cause that the apparently high rates charged for the transportation of freights by rail is principally due.

Persons having but a limited knowledge of the facts regarding the cost of such transportation, are very apt to cry out "monopoly," "extortion," and the like; but they forget that it is not an uncommon thing for transportation companies to carry a weight of 50,000 pounds one hundred miles, and then carry back to the same point 20,000 pounds, and all for the purpose of transporting 30,000 pounds of paying freight one hundred miles. It would seem from this that much of the present criticism upon the conduct of the managers of railroads is unjust, and not to be sanctioned under the existing state of things; for it is apparent that transportation companies, like all other companies, as well as individuals, should receive a fair compensation for the service performed.

While it is believed and held by the writer that the present charge on freight for long distances is not exorbitant, when it is remembered that so small a proportion of the load carried is paying freight, it is believed and positively asserted that it is possible to so construct cars in which such freight is carried as to reduce the non-paying freight one third at least, and thus enable railroad companies to proportionately reduce the charge made upon paying freight. That a reduction of the weight of freight cars to the extent above indicated can be made without in any sense impairing their strength, durability, efficiency, or convenience, is regarded as a fact, and I shall now offer some suggestions in support of it.

It is patent to all observers and thinkers upon this subject that the material of which our car-bodies and truck-frames are made is subject to various kinds of strains while in use, and hence it follows that such material should be selected with reference to its ability to resist such strains, the most suitable being such as will do it the most effectually with the least number of pounds of weight. The forces to be resisted are torsion, or the tendency to separate the parts by tearing them asunder; compression, or the tendency to thrust the parts into each other, or to bring the particles of which they are composed into more immediate contact; and lateral strain, or the tendency to bend, caused by the oscillation of the cars upon the track. Now, it is an ascertained fact that for tensile strain, iron is better than wood; but that for a thrust, wood is stiffer than iron, with a given weight of material. This fact would seem to make it necessary that

in the construction of cars, a judicious combination of wood and iron should be used in forming such parts as are subjected to the kinds of strain above alluded to. I have alluded to a combination of wood and iron, not because such combination is the best that can be made, but because it is customary to use iron in the manufacture of cars in place of steel.

The method of construction which seems most likely to give the greatest amount of strength with the least amount of weight, is to make all of the principal parts of the car-body and truck-frames of steel tubes, such tubes to be filled with wood for the purpose of stiffening them, and for the further purpose of increasing their ability to withstand the thrusts caused by suddenly checking the movements of the car. The force of this suggestion will be seen when it is stated that the main tensile strength of steel is 88,657 pounds to the square inch, while that of ordinary wrought-iron is only 17,600 pounds. Another and a very important feature is that the steel tube would be much stiffer than an iron one, and consequently much less liable to be bent by the oscillation of the car, or by thrusts upon its ends. With a car constructed as above indicated, I think it safe to assert that its weight would be reduced one third, or from 20,000 pounds to 13,333⅓ pounds, while its dimensions would remain the same as now, and its ability to endure extraordinary strains, caused by leaving the track or by a collision of trains, would certainly be increased. In constructing a car of this kind, it would probably be best to make the roof and siding of thin boards, as at present, they being so arranged as to keep the metal protected from water as much as possible.

Another and important change which should be made in railroad cars, is the narrowing of their bodies, so as to prevent any portion thereof from overhanging the rails of the truck upon which they run. It seems to be unnecessary to enter into any argument to prove that a large amount of the swinging and oscillating motion given to cars while in motion, is caused by the fact that they so far overhang the rails as to throw a large portion of the weight upon the wheels, which, for the time being, are the lowest, and thus as they rise again to a level with or above those on the opposite side, the overhanging weight upon that side causes a lurch in the opposite direction, which is not only injurious to the car, but also to the truck. With the two changes alluded to made, it would be perfectly feasible to reduce the weight of the wheels and axles to a considerable extent, and yet have them equally able to carry the load that would be put upon them; and the advantages to be derived would not end with the cars alone, as it would be seen to very favorably affect the truck by lessening the outlay upon it.

I should hardly do justice to myself or to my subject were I to pass from this branch of it without referring to the effect that the suggestions I have made, if carried out, would have upon the cost of transportation of freight, so far as the engines which furnish the power to move it are concerned. Suppose a train to consist of 30 cars, each one of which weighs 20,000 pounds, and suppose each one to be loaded to the extent of 25,000 pounds, it would give a gross weight of 1,350,000 pounds, only 750,000 of which would be paying freight. If we call 2000 pounds a ton, we shall find that we have 375 tons, which, at the rate of three cents per ton per mile, will give us $11.25 per mile, as pay for moving the load. These estimates being regarded as the limit of the capacity of the engine, it follows that all that engine is capable of earning is $11.25 per mile run; but if attached to cars the weight of which had been reduced as herein suggested, we should reduce the non-paying freight by 200,000 pounds, and hence we could add to the paying freight to that extent without imposing any additional tax upon the engine, or increasing by a single ounce the fuel consumed. The 100 tons thus added to the paying freight would increase the income per mile to $14.25, which would be about 27 per cent, and would, I think, be adding largely to the profits of the parties transporting the same; or, better yet, would enable them to reduce the cost of transportation to that extent, and thus give the benefit of it to consumers without in any way affecting the profits as compared with what they now are, excepting to make them indirectly greater by a saving in cost of maintaining their roads and cars.

What has here been said in reference to freight-cars is believed to be true of passenger-cars, except that the difference between the paying and the non-paying portions of the load is greater in them than in freight-cars.

Some of the passenger-cars now in use on our roads will weigh two thirds as much as an ordinary locomotive, or say twenty tons, and such cars will seat say sixty passengers, of an average weight of 160 pounds, which will give 9600 pounds of paying freight to twenty tons of non-paying, which will yield an income of $1.80 per mile run for transporting 49,600 pounds of weight.

As passenger-cars are run at a much higher rate of speed than freight-cars, it follows that every pound of weight which can be dispensed with is working still greater injury to the superstructure of the road, and at the same time necessitates a corresponding weight in the engine.

The reader who has had the patience to follow me through this article will very naturally ask, If the statements above made are correct, how is it that railroad companies can make money by carrying passengers at present prices, and why do they not take the necessary steps to reduce the weight of their cars? The answer to the first branch of the question is found in the fact that passengers load and unload themselves, and consequently the companies are at no expense on that account; but if this had to be paid for at the same rate per thousand dollars of income that freight is, I think the profits would be small; and if there was added to this the additional expense of switching, store-room, and risk of fire, it would be still less. The second branch of the question can, I think, be answered in one word—Custom. We are, as a people, undoubtedly too much wedded to custom, and it is to this that I attribute the fact that we go on using unnecessarily heavy cars, making all other things conform to this awkward practice, knowing and acknowledging it to be wrong, instead of making it conform to what the best practice of the world and our own judgments tell us is right. Permit me to ask the car-builders and car-users of this continent, Why do you make your passenger-cars so heavy, or why do you have them made so heavy? To these questions the answer will be, We desire to make our cars safe as well as convenient, and hence we make them strong, and in doing so we are obliged to make them heavy. Let us examine this statement, and see if the very fact that they are heavy does not make them unsafe, and if a large amount of the strength supposed to be requisite is not due to their weight, and not required for the safety of the passengers. It will not be denied that the weight upon the axles and wheels, and the lateral strain upon them and upon other parts of the car, is in proportion to their weight, the rate of speed, and the alignment of the rails; neither will it be denied that it is to enable the cars to withstand the shocks thus put upon them while running that they are made heavy or strong.

Now, it follows that if the weight of a car can be reduced without impairing its strength, the material used will be subjected to less strain, and consequently, the car will be safer, because more of its strength will be utilized in protecting the passengers, and less in resisting the strain caused by its own weight.

I am aware that there are many points which could properly be discussed in this connection which have not been touched; but enough has been said to indicate the writer's views, and I hope enough to turn the current of thought in this direction, and thus secure the much-needed reform.

A NEW car manufacturing company, with a capital of $200,000, was organized at Hannibal, Mo., recently. The name of the company is the Hannibal Car-Works.

Evans's Elevated Street Railway.

THE engraving on the opposite page illustrates a plan of an elevated railway, designed by Mr. James W. Evans, of this city. Its general features are so clearly shown in the illustration that, in describing it, we need only refer to some of the peculiarities of its construction. It consists of a series of iron bridges, 16 or 18 feet above the ground, each having a span of 260 feet, corresponding with the length of the blocks on our city avenues, and forming a continuous double track for the running of steam street-cars of such style and capacity as may be deemed most suitable. These bridges are supported, as shown in the cut, by substantial iron columns resting upon a foundation of masonry, and placed in the middle, or on one side of the street, as may be most expedient. Where the streets are wide, like our leading avenues, the structure may be placed in the middle, with supports at every crossing—these supports, with the stairways leading to the platform landings, constituting the only obstruction to the free use of the street for ordinary purposes.

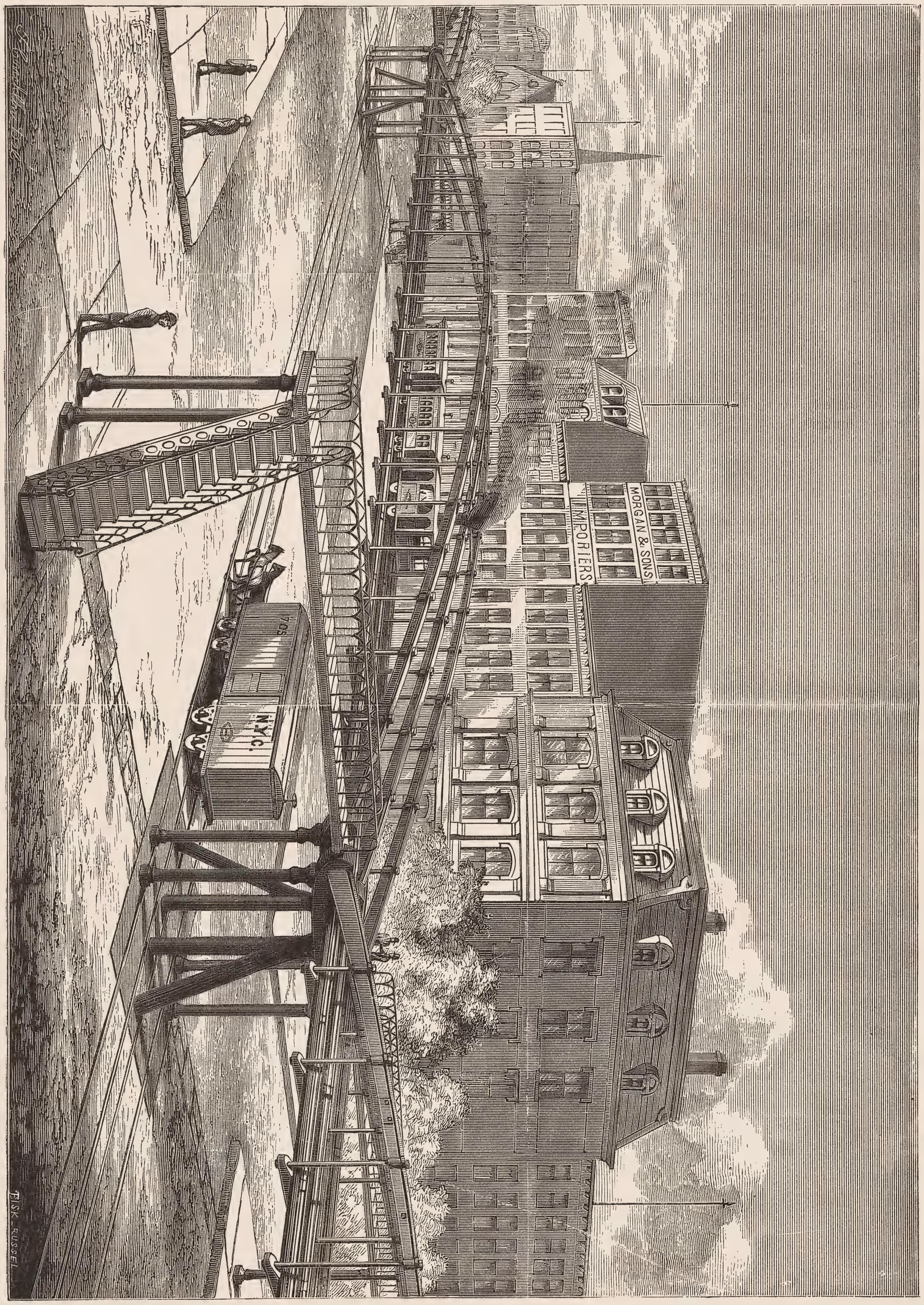
Each span is sustained by the combined strength of arches and wire cables, the latter being directly under the tracks or rails, and held at their proper tension by heavy nuts and bolts at each end. These cables are inclosed in a double tubing, made in sections of suitable length, and arranged so as to break joints; the inside tube being of wrought-iron and the outside one of cast-iron. In order to provide for the expansion from variations of temperature, corrugated steel rings, with sufficient elasticity, are placed between the sections. Upon these tubes are placed cast-iron sleepers or string-pieces, with grooves in their upper sides into which are fitted pieces of timber to which the rails are fastened. Above the bridge-flooring are iron arches extending from pier to pier, and sustained by substantial abutments at each end, the sections or pieces of iron composing the arches being spliced together so as virtually to form one continuous piece of the requisite lightness and strength. These arches support the track or roadway by means of vertical rods, twelve feet apart, and fastened by nuts to cross-pieces underneath, these being the only rods or bolts used in the construction. The bridges are in this way rendered sufficiently light and strong for the purpose required, with a surplus of strength which prevents the possibility of their giving way under any strain to which they may be subjected in the ordinary running of cars.

A model of a single-track bridge or section may be seen at the office of Vose, Dinsmore & Co., 32 Warren street, a glance at which shows the general advantages of the plan for purposes of city street transit. It is adapted to a single or double track, and may be used for wide or narrow streets, in the middle or along the sides. It has small weight of material, will interfere but little with ordinary street traffic, and when it is located on the side of a street, will cause the least interception of light to the lower parts of buildings. The plan is also adapted to railway bridges generally. Its cost is comparatively moderate, the estimate per mile for a double track being $160,000.

Any further information may be obtained by addressing or applying to James W. Evans, 32 Warren street, New-York.

The Baldwin Locomotive-Works.

THIS important establishment has passed from under the control of Mr. Matthew Baird, the distinguished head of the late firm of M. Baird & Co., into the exclusive possession of the other members of the firm, Messrs. George Burnham, C. T. Parry, E. H. Williams, W. P. Henszey, and Edward Longstreth, by their purchase of Mr. Baird's interest. The partnership expired by limitation, and was dissolved April 8. The style of the firm now is Burnham, Parry, Williams & Co., and the present firm publish by card that they are authorized to liquidate the affairs of the late firm.



EVANS' ELEVATED STREET RAILWAY.

Trial of Smith's Vacuum Brake.

A SERIES of interesting and satisfactory trials of this brake were made on the 18th ult. on the Newark branch of the Central Railroad of New-Jersey, in the vicinity of Elizabeth. The trials were witnessed by a number of practical railway mechanics, most of whom were car-builders who had come to the city to attend the regular monthly meeting at the rooms of the Association on the previous evening, and who had been invited by Colonel Ricker, the superintendent of the road, to accompany the train with which the trials were made. The party consisted of Messrs. A. Steinbach, of the Philadelphia and Reading Railroad; F. D. Adams, of the Boston and Albany; Joseph Jones, of the New-York Central and Hudson River; R. S. Ramsey, of the Pennsylvania R. R. C. M. Bissell, I. C. Buckhout, L. Garey, and W. M. Strong, of the New-York and Harlem; E. A. Olmstead, of the U. S. Rolling-Stock Company; J. E. Wiggins, of the New-Jersey Midland; M. C. Andrews, late of the New-York and New-Haven; G. W. Morris, of the Culmer Spring Company, Pittsburg; J. Franklin, of the Grand Central Depot, New-York; R. E. Ricker, George Hackett, and T. W. Peeples, of the Central Railroad of New-Jersey; Willis Davis, of the Empire Transportation Company; John Y. Smith, the inventor and patentee of the brake, and several others.

The brake is controlled entirely by the engineer, and consists of flexible air-chambers, in cylinder form, with light iron heads placed under each car and connected directly with the present system of hand-brake rods and levers. These air-chambers are connected with each other and with the locomotive by light iron pipes and flexible hose, fitted with air tight couplings. The brake is operated by an air-ejector, which exhausts the air from the cylinders, causing their heads, to which are attached the brake connecting-rods, to be drawn together, thus applying the brake-shoes to the wheels. The ejector is placed in the locomotive cab, is a simple and durable instrument, with no valves pistons, packing or springs, requires no special attention or adjustment, and may be readily attached to any style of engine. [For a more particular description, the reader is referred to the March number of THE CAR-BUILDER.]

The track upon which the trials were made has been recently constructed, is in good condition, perfectly straight, and with low grades. The train consisted of a 35-ton passenger-engine and tender, and six ordinary 19-ton passenger-cars — weather fair, and wind with train. The track was staked off with quarter-mile posts, and the rate of speed taken by stop-watches. The result of the several trials is given in the following tabulated statement :

Trials	Speed. Miles per h'r.	Distance. Feet.	Stops. Time. Seconds	Ft. per Second.	
1	35	520	16	32.8	
2	30	475	16	29.11	Desc'g grade 16 ft. per mile.
3	30	550	17	32.6	
4	30	520	16	32.8	
5	35	610	19	32.2	
6	33⅓	5550	..	....	Asc't 5 ft. pr. mile. Free running.
7	32½	550	16	34.6	Stopped & backed in 21 seconds.
8	36	597	17	35.2	
9	30	580	18	32.8	Engine working ahead, wide op'n.
10	30	505	16	31.9	
11	40	640	18½	34.11	
12	33½	535	16½	32.4	
13	36	580	18	32.8	
14	45	700	18½	37.8	

The seventh trial was made with a torpedo placed upon the track at a point unknown to the engineer, as a signal for applying the brake, the result eliciting the most unqualified expressions of approval from all present. Each of the trials was highly satisfactory, and every inquiry respecting details and special points was readily answered by Mr. Smith, who fully explained the working of the brake and every peculiarity of its construction. At the termination of the trials, the party returned to the city, and proceeded to the rooms of the Association, where the views of the company were embodied in the following preamble and resolution, which were unanimously adopted :

Whereas, By the invitation of Colonel Ricker, superintendent and manager of the Central Railroad of New-Jersey, we, as a party of practical railroad mechanics, have this day witnessed a series of trial-tests of the capacity of Smith's vacuum brake, on a train of passenger-cars, equipped with the same, on said road, therefore

Resolved, That we are equally surprised and gratified at the results of the several trials of this brake, showing the ease, reliability, and effectiveness of its action in the quick stoppage of trains at various rates of speed, and under circumstances as various as any trial-tests will admit; and that we herewith tender our cordial thanks to Colonel Ricker for the opportunity afforded us for its inspection; and to Mr. Smith the expression of our unqualified approval of his brake and our confidence in its capacity.

We also add the following trials made on the 17th April, during a heavy rain and brisk wind. Train same as above. J. C. Mulford, engineer of both trains :

Trials.	Speed. Miles per hour.	Stops. Time, seconds.	Distance. Feet.
1	35	12	525
2	35	14½	500
3	30	16	515
4	35	14½	455
5	25	20	320
6	20	12¼	280
7	30	15½	500
8	35	24½	455

No. 5. Stopped and backed in 20 seconds.
" 6. Engine working ahead.
" 8. Stopped and backed in 24½ seconds.

Steel Car-Wheels.

AN improvement recently patented in England, by Hadfield, of Sheffield, and described in *Iron*, is as follows :

An ordinary rolled crucible or Bessemer steel, iron, or other tire is heated as hot as possible, (without burning,) in a suitable furnace, and then placed in a casting-box, the nave being first placed in the centre and moulded thereto in the ordinary way. Molten crucible steel, or iron, or other metal, is then poured therein, whereby it becomes united together in one solid or hollow homogeneous weldless wheel, thus obtaining a combined wheel of great strength, elasticity, and tenacity, free from the defects and liability to breakage of those in ordinary use. The wheel is afterward annealed, if required.

For wheels of a similar construction to those at present in ordinary use upon railways, the tire is first suitably heated and placed in the casting-box, and then the nave placed in the centre. Pieces of crucible or Bessemer steel, or wrought-iron, of the necessary thickness, cut into suitable lengths to for n the arms or spokes, are arranged around, and retained in their position by moulding in the ordinary manner. Molten steel, iron, or metal is then poured in or otherwise introduced, until they become united into and form one solid homogeneous weldless steel or metal wheel. These wheels are said to be peculiarly free from jarring and concussion, as well as more economical than ordinary wheels, and they are not so liable to sudden expansion or contraction. The absence of complicated tire-fastenings is another very advantageous feature.

THE Jackson & Sharp Company, at Wilmington, have just completed six or eight narrow-gauge passenger-cars for the Memphis and Raleigh (Tenn.) Railroad, which are perfect beauties—also, several palace-cars.

Wrecking.

EDITOR OF THE NATIONAL CAR-BUILDER :

DEAR SIR : This is a subject of much importance in railway economy, but which has not received the attention it deserves. Railway managers, as a rule, are not inclined to discuss it, but prefer talking about other means and devices for reducing the present meagre running expenses and increasing dividends. Whenever the master mechanic of a new road suggests the propriety of adopting some systematic means for removing wrecks, he is met with the ever-ready answer that the company is too poor and can't afford it, and that he must get along with what he has got, which may be a couple of jack-screws, a switch-rope, hammer, monkey-wrench, and cold-chisel. The remark of a master mechanic of a new road at the West, when spoken to on the expediency of having some better means for wrecking, is quite significant. "We will keep quiet," he said, "and submit to the inconvenience; there is no use in saying any thing to the president or superintendent now. They will doubtless see the necessity of procuring suitable apparatus when they find a train in the ditch or through a trestle-work, and no tools to get it out with." A stitch in time saves nine is true economy, and applies as well to railway operation as any other kind of business.

We are aware that many roads, especially leading lines which have a heavy traffic, are provided with very effective means for dealing with wrecks; but this can not by any means be said of numerous roads just starting, or which do a comparatively lighter business. Before the days of derricks and tool-cars, it was quite customary to burn wrecked cars to get them out of the way, there being no available means for readily handling such a cumbrous weight of material. This plan was effective and tolerably expeditious, but rather an expensive one where accidents were of frequent occurrence. No road in these days should be without a derrick and tool-car; and where the road has several divisions, a set of these cars should be located on every two of them, or where they join or intersect.

A very good style of wrecking-car, adapted to light work, such as lifting wheels, castings, etc., has been in use on one of our Western roads. It is about 40 feet long, with a derrick on one end, the mast being about 12 inches diameter at the base, and 8 inches at the top, and supported by a piece of timber 5x12, running across the car about 2 feet back of the transom. At the middle of this cross timber is a cast-iron pocket, with a three-inch hole in the centre, in which a cast-iron plate attached to the bottom of the mast revolves. The boom is set in a casting, fitted around the base of the mast, and consists of two pieces of yellow pine, 4x7, set edgewise, 10 inches apart at the base, and 4 inches at the point where they are connected by a pocket casting, in which is a pulley wheel. Over this wheel the rope or chain is run, and connects with the crank at the other end of the boom. At the end of the car, opposite the derrick, is a tool-house, large enough for the men to ride in while going to and from their work. This car, however, was found to be inadequate for the work required to be done, and another was designed and built. The body of this car is 30 feet long, with eight longitudinal sills, 6½x10, the middle being supported by four 1½-inch truss-rods. On a central pedestal, 6 feet high, is a cast-iron plate with a conical pivot, in which the mast is set and upon which it revolves. The boom is of wrought-iron, securely trussed, to prevent it from springing, and so constructed that it can be taken out and laid on the car floor when not in use. Each end of the transom is provided with an eye, into which a clamp can be hooked, and with the aid of which the car can be fastened to the ties, to prevent its turning over under a heavy strain. This car has 26-inch wheels, and sets low on the trucks. As auxiliary to it, a baggage-car was converted into a tool-car, and a flat car loaded with pine blocking, a few rails, and a frame 12 feet long, for running wheels and trucks upon cars—altogether constituting a complete wrecking train.

During last year a very substantial derrick-car was built by Mr. R. Reniff, the master car builder of the Bloomington shops of the Chicago and Alton Railroad. At the time the writer saw it it was incomplete, but was provided with a mast at each end and on the pivot principle, which does not necessitate the use of guys. The advantages of two derricks are obvious. It is not necessary to turn the car, and both ends can be used at the same time, if desired.

For ordinary wrecking purposes, a tool-car should be provided with two lever hook ratchet jacks, two long 6-ton and two short 10-ton hydraulic jacks, and two short telescope screw jacks. With these any work can be done for which jacks are used. One 1½ inch and one 3-inch snatch-block are indispensable where the locomotive is used as a power for raising wrecks. Two sets of double falls are useful; and in order to suit the snatch-blocks the ropes should be 1½ and 2½ inches in diameter, and from 150 to 200 feet in length. One 2½-inch switch-rope 12 feet long, and one 3½ inches and 20 feet long, are very serviceable; also about six chains of various sizes, from ⅝ to 1-inch iron, with a hook at each end, the links in all cases being large enough to hook into; also two large grappling-hooks, for catching wheels that are under water, two spread-hooks for raising trucks, half-dozen hickory hand-spikes 6 feet long, pinch-bars, fork and monkey-wrenches, a cross-cut log-saw, hand-saws, hammers, chisels, shovels, picks, malls, sledges, axes, and torches for night-work.

Every wrecking train should be under the supreme control of an experienced and capable wrecking master, who should be subject to no interference from petty officials. He should have a dozen or so good men accustomed to the work, and familiar with the use of all the necessary appliances. MACK.

The Loughridge Air-Brake.

THE success of the Westinghouse brake has stimulated invention and experiment in devising methods of applying compressed air in operating brakes. On the Baltimore and Ohio Railroad, Mr. Loughridge, who for many years has given his attention to the construction of continuous train brakes, has recently applied an atmospheric brake of his own design to several trains on that road.

The air is compressed by a pump, which is worked by an eccentric on the front driving-axle. The diameter of the pump-cylinder is 7½ inches, with 6 inches stroke. The air is pumped into a reservoir under the tender. This reservoir has a capacity of about fifteen cubic feet. It is necessary to run about half a mile to produce a pressure of 80 or 90 pounds per square inch in the reservoir. When that pressure is reached, the pump is stopped, but is always started again after a stop is made.

The air is applied to the brakes by small cylinders under each of the cars, which are connected to the air reservoir by half-inch pipes. These are coupled together between the cars by flexible hose.

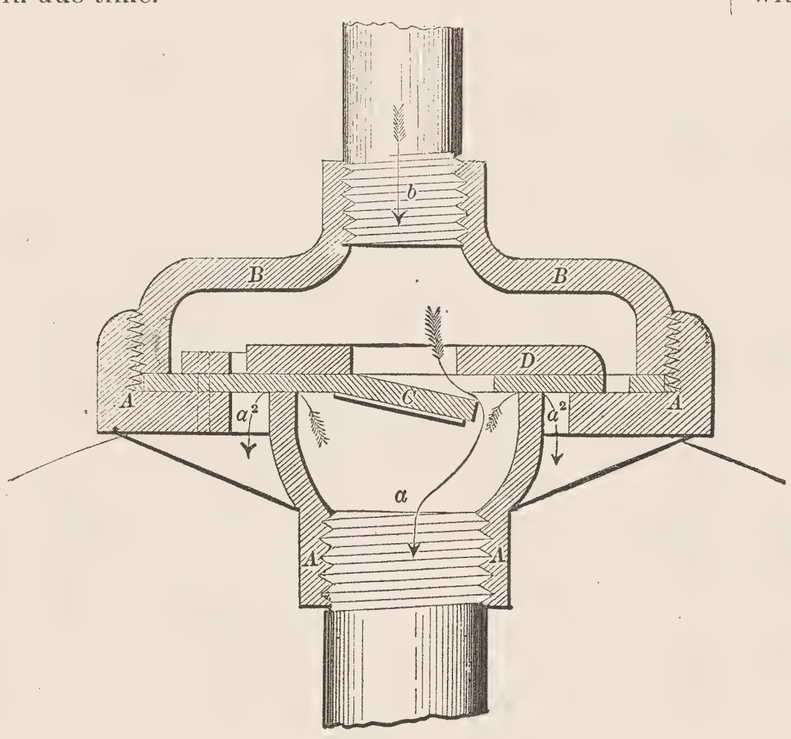
A train with this brake has been in daily use for ten months between Baltimore and Winchester, Va., making with two engines 226 miles daily. The enginemen control the braking at all the stations, and on the heavy Mount Airy grades. It is said that the brake has not failed during that time, and that it has worked satisfactorily to the locomotive runners. It is claimed by the inventor that the plan is simple, cheap, and certain in its action, that with it it is impossible to slide the wheels, and that no valves are used in the connecting pipes. He has been experimenting and constructing continuous train brakes for the past seventeen years, and has been engaged in perfecting his atmospheric brake for the last eighteen months. The fact, however, that it is necessary to run half a mile before full working pressure can be accumulated seems to be an objection to the plan, as it is frequently necessary to apply the brakes immediately after leaving stations, especially where there is a descending grade at such places.—*R. R. Gazette.*

A Single-Rail Track.

MR. W. K. REYNOLDS, of St. John's, New-Brunswick, has patented a plan for a single-rail track, and also for an improved coach, suited for running on the same. The track consists of a series of posts or timbers firmly set in the ground by a pile-driver, or some means that will insure their permanence and exact vertical position. These will be some seven or eight feet above the earth and eight feet apart, sawed off at the top and made even and true; they will then have bolted to them a good solid timber twelve inches square. On the top of this will then be bolted a heavy 5-inch rail in the shape of an inverted **U**. The roadway is now complete.

The cars are fifteen feet wide and two stories high. Much of the first story is in two parts, hanging on the rails, like panniers on a mule's back. All the cars, including the locomotive, are thus constructed, and is therefore suspended on this great central rail—no part touching the earth. To prevent oscillation there is on each side of the posts a continuous rail or bar, and on the parts of the cars most likely to come in contact with the posts are a series of rollers that will always act as fenders. It seems, however, to be the purpose of the inventor to have the cars and locomotive so evenly balanced, and their weight so much greater below the centre of the wheels than above, that the whole train will hang steadily upon the rail.

The inventor urges the advantages of his plan as peculiarly adapted to a new country, or a region of deep snows, and that a speed of one hundred miles an hour could easily be attained upon such a track. The ordinary cost of roadway, grading, ties, etc., would also be reduced two thirds. This certainly looks as if broad-gauge had seen its best days, and that the standard and narrow gauges are likely to become obsolete in due time.



Exhaust-Valve for Air-Brakes.

THE invention illustrated by the cut is especially designed for the escape of air or steam from brake-cylinders upon railroad cars, to allow the air or steam to escape instantly and simultaneously from the cylinders of all the cars, but which may be applied with advantage to other uses.

A B is the box which contains the valve. The part A forms the valve-seat, and is connected at the exhaust *a* with the brake-cylinder. The part B forms the cover, and is connected at the inlet *b* with the supply-pipe. C is the inlet-valve, which has its seat in the centre of the exhaust-valve D, and opens toward the exhaust *a*. D is the exhaust-valve, which has its seat upon the part or plate A, and covers the passage *a* leading to the cylinder and the annular passages or openings a^2 formed in the part A around the opening *a*, and leading into the open air. The valves C D are represented as being hinged to their seats, but their construction is immaterial, and they may move up and down upon guides, if desired.

When the engineer admits the air or steam, it presses open the ingress-valve C, and passes through the passage *a* into the cylinders, and at the same time holds the valve D firmly to its seat. When the air or steam is let off from the inlet-pipes, the pressure in the pipes will be instantly reduced, and the expansion of the air or steam within the cylinders forces open the valve D, and allows the said air or steam to escape into the air through the openings a^2.

By this construction, the air or steam will escape instantly from all the cylinders, withdrawing all the brakes at the same time.

Further information may be ob ained by addressing the inventor, Mr. William Riley, or Charles R. Peddle, superintendent of motive power and machinery, St. Louis, Vandalia and Terre Haute Railroad, Terre Haute, Ind.

Obstinate Screws.

FEW things are more vexatious than obstinate screws that refuse to move, much less to be drawn out and in the struggle against screw-driver power, suffer the loss of their heads, like conscientious martyrs, rather than take a single half turn backward from the course they have followed, and from the position they have been forced into. Like obstinate children, they must be coaxed or rapped pretty hard on the head according to circumstances; in fact, whoever has a tight, obstinate screw to "draw out," must keep his temper down, and his resolution up quite as much to the sticking point as the screw does; but of all the "screws" one has to deal with, whether they be in the flesh or made of iron or brass, the "old screw" is the worst, and, like an old tooth, must be considerately dealt with, upon the old principle *suaviter in modo, fortiter in re.* Well, firstly, let us consider the *suaviter in modo.* If the screw is turned into iron and not very rusty, it is only necessary to clear the head with the edge of the driver, and let a few drops of oil penetrate to the threads; but finding that excessive heat or rust has almost fixed the screw immutable, then heat it either by placing a piece of hot iron upon it, or directing the flame of the blow-pipe upon the head, and, after applying a little oil, turn out gently, but care must be taken not to let the tool slip so as to damage the notch. If, however, the screw happens to give in, or rather remain in and refuse to come out, try to force it back with a blunt chisel, smartly but carefully tapped with a light hammer; but, if evidently nothing can dislodge the enemy, it is best to cut the head away and drill out the screw. When an obstinate screw happens to be in wood, merely give it a few taps on the head; but failing that, heat it with a piece of hot iron, when it will turn out easily.—*Hub.*

The Timby Patent Freight-Car.

THE Erie Car-Works, at Erie, Pa., have recently built a new style of freight-car, of which Mr. T. R. Timby is the patentee. The peculiarity of its construction consists in introducing a set of springs between the floor upon which the freight is carried and the body of the car, thus interposing two separate sets between the load and the truck, the object being to give the freight an easier carriage, and relieve it from the thumping and pounding which is so injurious to various kinds of merchandise and damaging to the trucks. So far as the car has been tested, it has given entire satisfaction, and promises to be a valuable improvement in the construction of this class of rolling-stock. Its weight is 16,500 lbs., and the increased ease of motion is very apparent when running over a rough track with a full load. The additional weight of the springs is trifling. It has already received the approval of several railroad officials, and we are informed that it is now at Altoona, where it is being examined and tested by the officers of the Pennsylvania Railroad.

THE fool has one advantage over the educated man—he is always contented with himself.

The National Car-Builder,

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JAMES GILLET, EDITOR.

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MAY, 1873.

Editorial Announcements.

CORRESPONDENCE.—*We cordially invite the coöperation of the railroad public in affording us the material for a good mechanical paper. Articles relating to rolling-stock and machinery, by those practically acquainted with those subjects, will be gratefully received. All communications must be addressed to Vose, Dinsmore & Co., No. 32 Warren Street.*

The name and address of the writer must accompany all communications designed for publication.

ADVERTISING RATES.—*For one square, or one fifth of a column, $5 per month, or $50 a year. For half a square, $3 per month, or $25 a year. Larger advertisements by special contract.*

All communications in regard to advertising should be addressed to L. F. DINSMORE, *Post-Office Box* 4055, *New-York City, who is our agent for advertising, and authorized to make contracts, collections, etc.*

ENGRAVINGS AND ILLUSTRATIONS.

We would invite the attention of Master Car-Builders and others to the advantages to be derived from publishing in THE NATIONAL CAR-BUILDER *engravings designed to illustrate the various features and details of car construction, and especially such improvements as can not otherwise be clearly presented. We will procure cuts to be made in the best manner from drawings or models that may be sent us, and charge only for the cost of engraving, inserting the same in our paper with suitable descriptive details, without charge.*

Railway Master Mechanics' Association.

THE sixth annual meeting of this association, to be held in Baltimore, commencing on the 13th of the present month, promises to be a most important and interesting one. In view of the primary objects of the organization, and the many important subjects which will necessarily be presented for consideration, we anticipate a very full attendance from every section of the country. The vitality of our great and growing railway system, and its capacity of adaptation to the requirements of a vast population with its diversified industries, depend upon the skillful and economical management of its machinery department more than upon any other one thing. This department, in its scope and multiform detail, constitutes in fact the very life of the system, without which it would not be entitled to a name. A meeting of the most intelligent representatives of this department, coming directly from their various spheres of active duty, with a great deal of valuable experience acquired in the service of roads located in different States and sections, and subjected to different kinds of management, can not but be productive of good results. It affords an opportunity for formal and informal discussion; and this involves an exchange of views, a comparison of individual experience, and a general ventilation of ideas upon all sorts of mechanical problems connected with railway operation. There can hardly be a doubt that the future of railroading in this country—and not a very remote future, at that—will disclose a vast deal of improvement in the construction and application of machinery and life and labor-saving devices, of which we now have little or no conception. The present relation of railroads with the productive energies and resources of the country, necessitates greater economy in their management in order to afford cheaper transportation; and one way to bring this about is to abandon the false economy of using inferior material for construction and equipment merely because it can be had at a low figure. This kind of policy is only sowing the wind and treasuring up wrath. Get the best material, be it iron, steel, or timber, put it together after the most approved designs as respects safety and durability, and then take care of it in the best possible manner.

The present meeting of the master mechanics, judging from the catalogue of subjects in charge of special committees, will shed additional light upon boiler explosions and construction, the form of car and locomotive axles, the best kind of train-brakes, the comparative value and economy of different kinds of fuel, and kindred topics of equal importance. The meetings have hitherto been attended by a great degree of harmony and good feeling. Individual prejudices have been laid aside and nothing of a personal nature has interfered with a calm and candid discussion of matters brought before the association with the view of promoting the general interests of American railroads. What has been done so far, however, may very properly be regarded as only the initial steps toward the development of a more thorough system of railway equipment. The work must be prosecuted with energy, zeal, and perseverance, and by and by the results will be apparent. The association is yet young in years; but the time will come, if rightly improved, when its members can look back upon deeds accomplished which will place their organization in the front rank of similar associations known in the world.

Those who Read and Those who Write.

THAT this is an age of progress is a hackneyed truism. The inseparable conditions of such progress, especially in the field of mechanical inventions and appliances, are hard thinking, incessant activity, experiment, rivalry, and conflict of opinion. These are the efficient means by which truth is separated from error, theories tested, fallacies exposed, and absolute facts ascertained. Were it otherwise, stagnation would ensue and the advancement of the race be brought to a stand-still. The Patent-Office would be a useless bureau, and the mental activity which now spends its force in the discovery of new devices would become paralyzed, or be diverted to other and less useful channels.

That much diversity of opinion exists among those who are directly engaged in the business of car-construction, is apparent from the various methods and devices employed in the details of such construction, and we are quite aware that every number of our paper contains more or less, in the way of statement and suggestion, concerning such details, which does not meet the approval of every reader. Were it not so, ours would be a very extraordinary publication indeed. Every sentence necessarily expresses the views of some individual mind liable to be under the influence of a particular bias, seeing things from a special point of view, or reasoning by mental processes peculiar to itself. The press, especially mechanical and technical journals, is a medium of opinion, the arena of question and answer, of inquiry and sharp criticism; and it is by and through such a medium that an effective coöperation can be established between those who read and those who write, between those who seek information and those who are able to impart it. The writer sometimes knows less than the reader about the particular subject in hand—such cases, we have reason to believe, have actually occurred. Now it seems to us that when any railway mechanic reads any thing in papers of the class alluded to, touching mechanical appliances or methods, that strikes him as erroneous, it is his obvious duty, if his time will permit, to reply to it and show wherein the writer is at fault. We do not, of course, refer to what is manifestly absurd and unworthy of notice. There are a great many practical men who can impart verbally much valuable information in a very short space of time, but who find difficulty in writing out precisely the same thing on a sheet or two of paper. Let us persuade all such to give their ideas regardless of the words in which they are dressed. All we want is to get at your meaning. Make that clear, and we will put it in such shape as to be of service to our readers as well as to ourselves.

Don't Forget the Circulars.

THE committee on brakes, appointed by the Master Car-Builders' Association, are engaged in preparing a report on this most important subject, to be submitted to the annual meeting in June; and as the value of this report will in a great measure depend on the material in the shape of information furnished the committee by railway mechanics and operators in every part of the country, we are requested by the chairman to call the attention of all who have received the committee's circulars asking for such information, to the importance of a prompt reply to the several interrogatories embraced therein. This matter of answering circulars is too much neglected, and the usefulness of the association is impaired in exactly a corresponding degree. There is a disposition to leave every thing to the individual members of the committee, as if they were able, of themselves, to procure all attainable information upon the subject in hand. A committee like the one to which we refer, consisting of three persons only, can no more be expected to make up a comprehensive and elaborate report without the aid of others in furnishing material for that purpose, than the association, as a collective body, can be expected to reach right conclusions without the aid of committees in the matter of preliminary inquiry and investigation. Thus far only about twenty replies to the circulars of this committee have been received by the chairman, when there should have been not less than fifty. As regards the quality and staple of the replies received, we are not prepared to speak. It may safely be assumed that some of them, at least, fall far short of what they should be, either from indifference or lack of intelligence, or want of time to digest and arrange the information actually possessed by those who make them. Another month remains before the general meeting of the association, and we entreat every one who is remiss in responding to the circulars of this or other committees, to lose no time in the performance of this imperative duty. If you know but little about any particular topic, give your associates the benefit of what you do know; if you know a good deal, your delinquency is all the greater for neglecting to impart it. Those who have received the circulars of the committee on brakes, hardly need be told that replies should be addressed to the Chairman, R. S. Ramsey, Pittsburg, Pa.

Uniform Axles and Journals.

AMONG the many important subjects which will claim the attention of the Master Car-Builders' Association at their meeting in Boston next month, is that of fixing upon a size of axles and journals which shall in future be recognized and adhered to as a uniform standard by all roads. To determine by a mere majority vote what this standard size shall be, will not, in all probability, be a very difficult matter. It is to be hoped, however, that if any final action is taken, the size agreed upon will receive the approval of the entire body; or, should there be a small minority of dissenters, they will, after the fashion of political conventions, forego their opposition for the sake of harmony, and make the "nomination unanimous." We are not going to discuss the matter of size in this brief paragraph, even if we felt prepared to do so. There will be plenty of discussion on this point—as there should be—when the convention meets; and we hope every member will qualify himself to participate therein by a good deal of earnest thinking, and a careful exami-

nation of his own individual views and local prejudices before he sets out for the "Hub." As the action of the convention, whatever it may be, will depend upon the voluntary acquiescence of the roads to carry it into effect, it is important that what is done should also be approved by superintendents and the higher grades of railway officials. In order to secure such approval, we hope that railway officers of every class, and especially superintendents, will attend the meeting next month, and give the convention the benefit of their counsel and coöperation in a matter of such importance to all roads. They may not realize perhaps quite as thoroughly as car-builders do, who have charge of rolling-stock repairs, the enormous inconvenience of the present diversity of sizes; and for this reason their presence is the more to be desired, as they will, by hearing the subject discussed, be brought in closer contact with it, and thus be able to make valuable suggestions that will lead to a speedy realization of practical results.

Car-Builders' Monthly Meeting.

THE attendance at the rooms of the association on the evening of the 17th ult. was a very good one in spite of the heavy storm which had prevailed during the day. Among the car-builders present were Messrs. Steinbach, Adams, Jones, Garey, Varney, Ramsey, Andrews, Olmstead, Smith, of the Erie Railroad, and also a number of other gentlemen interested in the purposes and objects of the meeting. After a brief inspection of various devices in the form of models, which had been sent to the rooms since the last previous meeting, including a door and sash-lock, a self-coupler, oil-box lid, adjustable dust-excluder, etc., the meeting proceeded to the consideration of the special subjects of discussion, namely, car-axles, journals, and journal-bearings.

Remarks were made by most of the car-builders present, who confined themselves more particularly to the size and capacity of journals, and the necessity of adopting a uniform standard, to be used by all roads. Mr. Adams, after reading the report of the committee on the subject, published in the March number of THE CAR-BUILDER, said that although he had signed the report with the other members of the committee, the size of journal recommended, (7x3½,) did not meet his approbation. He was in favor of a larger journal, say 3¾ or 4 inches in diameter, with a wheel-seat not less than 4⅞; and hoped when the car-builders met in convention, they would be able to take a broad view of this subject, by laying aside all individual partiality, and adopting a standard that would benefit all roads collectively. He dwelt upon the inconveniences resulting from the diversity of sizes now in use, which every railway mechanic knew from daily experience. He also said he had of late examined some of the best authorities on the subject of friction, and was fully convinced that the weight carried had far more to do with it than the surface and size of journals. He did not believe increased journal surface increased the friction.

The views of Mr. Adams in regard to the advantages to be derived from the general adoption of larger journals than those now in use, were substantially concurred in by every car-builder present, except Mr. Varney, of the Fitchburg Railroad, who was using 5½x3⅜ journals, and was not inclined to favor any material increase of size, believing that an increase in diameter would increase friction, and that a longer journal, with the bearing too far from the wheel, would be more liable to break.

Mr. Smith favored a larger diameter of journal as being less liable to break or heat. On his road they replaced 7x3½ with 6x3¾. The former size broke more frequently than the latter. The president of the company had proposed to build 25 cars with 7x4 journals, and the same number with 7x3¼, and test them by running. Mr. Smith denied that a larger diameter increased the friction, nor did he believe it was any additional tax on the motive-power. He was decidedly in favor of fixing the standard at not less than 7x3¾.

Messrs. Steinbach, Olmstead, Ramsey, Jones, and others expressed similar views, some advocating journals as large as 8x4. As an index of the sense of the meeting, an informal vote was taken on the proposition that a diameter of not less than 3¾ inches was desirable as a standard, and it was decided affirmatively with but one dissenting voice. Many of the voters, however, were in favor of a diameter of 4 inches.

After some further conversation, the meeting adjourned. The next meeting will be held on the 15th of May.

Our Directory of Superintendents and Purchasing Agents.

WE commence with the present number of THE CAR-BUILDER the publication of a list of railway superintendents and purchasing agents, which, in connection with our list of master mechanics and master car-builders, will be continued as a permanent directory for the convenience of our readers. In order to make this directory as correct as possible, we have recently sent printed circulars to all, or nearly all, the roads in the country, with blanks to be filled with the names of the principal officers. A large proportion of these circulars have been returned with the names inserted, and from these we have made up our new list and corrected the old one. The blanks in the column of purchasing agents will be filled as fast as we can procure the names from reliable sources. The entire catalogue will be carefully corrected every month, and made as complete as the nature of the case will permit. It will contain, in a compact and accessible form, the names of the several roads and the four classes of officials connected with them, and will be much more reliable and convenient for reference than the yearly Manuals, which in this respect become nearly obsolete a few months after their publication, in consequence of the numerous changes that occur from death, resignation, and otherwise.

In a directory of this kind, there will always of course be some errors and omissions in spite of the most careful revision; and in order that their number may be as small as possible, we earnestly request our readers to give us early advice of any corrections that should be made. In doing so, it is important that all proper names, whether of individuals, roads, or places of residence, should be clearly and legibly written, and the names of persons spelled correctly, or exactly as their owners spell them. When the initials J and I are used, the proper distinction should be made so one will not be mistaken for the other.

To make room for this additional list of superintendents and purchasing agents, and also to accommodate the constantly increasing favors of our advertising patrons, we have been obliged to increase the size of our paper by the addition of four pages, making twenty-eight inside pages in all, being an enlargement of twenty pages since the first number was issued.

Testing Railway Car-Springs.

WE have received two or three printed circulars to which are appended the names of sundry gentlemen having charge of the motive-power and rolling stock of Western railroads, and which purport to give the results of trial-tests of various railway car-springs. A mere glance at the statements contained in these documents is sufficient to show that the tests were very imperfectly made, or that serious typographical errors were suffered to go uncorrected. Every intelligent railway mechanic, with any practical knowledge of springs and their adaptation to the uses required, will be little disposed to rely upon statements which are so manifestly erroneous as some of those to which we allude.

One of these circulars says, for instance, that three gum or rubber springs, 6 inches in diameter and 6 inches high, with a ¾-inch hole, when subjected to a pressure of 13,000 lbs., were depressed to $4\frac{9}{16}$ inches, and that with this weight they still had half an inch motion. Now, any one at all familiar with the action of a good rubber spring, knows that a spring of the dimensions named is capable of a much greater depression without exhausting its motion—indeed, that there is no actual limit short of bursting. We have ourselves compressed a spring of this kind and size 3½ inches without exhausting its elasticity.

It is also stated that a case or group of ten-coil rubber centre spiral springs was compressed by a weight of 7000 lbs. from 6½ to $5\frac{9}{16}$ inches—which would be a compression of only $\frac{15}{16}$ of an inch — and that at this point it had little or no motion. These several spirals have usually a maximum motion of 1½ inches, the actual contact of the coils being the only limit. We have tested a group of the same kind of springs, (ten in a group,) on a perfectly reliable Dudgeon tester, with the following result:

Light over all,		6½ inches.
2,000	pounds,	6 "
4,000	"	$5\frac{13}{16}$ "
6,000	"	$5\frac{10}{16}$ "
8,000	"	$5\frac{8}{16}$ "
10,000	"	$5\frac{5}{16}$ "
12,000	"	$5\frac{3}{16}$ "
14,000	"	$5\frac{2}{16}$ " home.

When relieved, it returned to its original height.

The tests of Hebbard springs, given in these circulars, are unintelligible, and defy elucidation. A "six by eight" spring, for instance, under a weight of 8500 lbs., is depressed all the way from 6½ (!) to $4\frac{11}{16}$ inches, at which point it was "nearly solid." By way of comparison with this, we have tested a four-coil Dinsmore spring, 8 inches diameter, 6 high, with the following result:

Light,		6 inches,
4,000	pounds,	$5\frac{3}{16}$ "
6,000	"	$4\frac{14}{16}$ "
8,000	"	$4\frac{11}{16}$ "
10,000	"	$4\frac{9}{16}$ "
12,000	"	$4\frac{8}{16}$ "
13,000	"	$4\frac{7}{16}$ " home.

On being relieved, it came back to its original height.

The tests of elliptics, as given in these circulars, show a good movement, especially as compared with a certain ten-ton freight-car combination or group spring, containing 80 spirals. This latter spring, standing 7⅛ inches light, was depressed only $1\frac{1}{16}$ of an inch under the enormous weight of 11,500 lbs., with no stated motion left; which is equivalent, or nearly so, to no spring at all, being little better for the purpose required than an unyielding mass of iron.

We would suggest that when tests are made of different kinds of springs, and especially when the results are placed before the public in the form of circulars, the greatest care should be taken to make such tests perfectly accurate and reliable; otherwise, they can have but little influence with railway mechanics in determining the relative merits of the springs tested.

Annual Conventions.

THE American Railway Master Mechanics' Association, in Baltimore, beginning May 13. Headquarters, Carrolton House.

The Railway Association of America, at the St. Nicholas Hotel, in New-York, on the 14th and 15th of May.

The American Society of Civil Engineers, on the 21st and 22d of May, in Louisville.

The Master Car-Builders' Association, on the 11th, 12th, and 13th of June, in Boston.

THE plans for the Union Passenger Depot at St. Louis, which is projected upon a scale of unusual magnificence, have already been approved, and its erection will be inaugurated at no distant day. The part allotted to the railroads is designed to be as complete as possible. It is proposed to employ smoke-consuming engines for the purpose of running the trains into and out of the tunnel and depot. The floors will be deadened, and the trains will be operated by signals.

Trial of the Westinghouse Air-Brake.

A VERY successful trial of this brake was made on the 9th of April, on the Eastern Railroad, near Revere, under the supervision of a committee consisting of the following gentlemen: Hon. W. R. Lee; Hon. George B. Loring, President Massachusetts State Senate; Hon. E. P. Carpenter, Chairman Committee on Railways; Hon. A. D. Briggs, Railroad Commissioner; Mr. A. A. Folsom, Superintendent Boston and Providence Railroad; Mr. C. W. Slack, Editor of the *Commonwealth*. The train consisted of a locomotive weighing 35 tons, with a tender weighing 20 tons, and 8 cars weighing 128 tons. The number of passengers was about 200. Stops were made in 15 seconds, within distances varying from 415 to 512 feet, and at rates of speed varying from 30 to 34 miles per hour. In one of the experiments, the train was stopped in 21 seconds, distance 685 feet, engine wide open and working ahead, the brake being applied from one of the cars—speed 30 miles an hour. Another was made by brake working automatically, the train being cut in two and running at full speed —stopped in 13 seconds, distance from flag 73 feet, with 270 feet remaining between the parts of the train. Another was made by breaking the engine from the train—the brakes working automatically. The result was the stopping of the train in 17 seconds; the distance run from signal was 350 feet, and the velocity of the train was 35 miles per hour.

The committee expressed their entire satisfaction with the trials made.

Steel Boilers.

FROM a late number of the *Deutsche Industrie Zeitung* we learn that Mr. R. L. Haswell, Engineer of the Austrian State Railway Company, spoke on this subject in the Society of Austrian Engineers. He remarked that the accidents which had occurred on railways using locomotive boilers of steel had thus far been only ascribed to the material; yet this was due, on the one hand, to the preparatory working of the plates, and, on the other, to the small thickness, as well as to the insufficient mode of assorting them before they were used. The State Railway thus far has used about 50,000 hdw. steel plates, among which only 200 hdw. were thrown aside during the manufacture of the boilers. Haswell only knows of five instances where such boilers got cracks, four of which occurred in the fire-box plate and one in the cylindrical part. Haswell ascribes their faulty condition to the fact that they were rolled when too warm. This shows that even by purchasing steel plates from the most renowned establishments and of the best quality, one cannot depend on their superiority for the purpose in question, without assorting them with the utmost care, because it can readily occur that in heating the plates one or more gets spoiled. Hence, in the establishments of the State Railway all plates are subjected to tests for their tensile strength before they are used. That these tests are perfectly reliable is shown by the fact that of 350 boilers consisting of steel plate only a single one was found torn thus far, and this in the cylindrical part. The box-plates not having been tested, it is readily explained that four boilers were injured in those parts. But, although these plates had undoubtedly been impaired in their strength by over-heating, they would probably not have been torn if the construction of the machines, namely, the boiler supports, did not involve an immense strength. In order to obtain steel boilers answering all requirements, only correspondingly thick plates, and plates of the best material, without any addition (for otherwise the steel is not homogeneous) ought to be used; they ought to be scrupulously assorted according to the texture and tensile strength. After boring or punching they should be carefully annealed, the riveting must be performed with pedantic care, and the bending only with wooden hammers. That steel plates manufactured in Austria are of excellent quality, is proven by the manner boilers are there constructed; the box front-plate, down-cover, and the sides of the tubes are only furnished with an edge or border, while in England they are compelled to use angle-iron for these connections. Steel plates are preferable to iron plates, owing to the fact that they possess the same degree of elasticity in all directions, (from 12 to 15 per cent;) in iron plates it is, in the direction of the fibres, according to Kirkaldy, about 15 per cent, but in a cross-direction only 5 per cent. If one proceeds in the manner indicated, says Haswell, steel plates may be used with perfect safety. The boiler manufacturer has the advantage that he finds less plates to throw aside, and the railways, on the other hand, will have more carefully constructed, stronger, and, in the end, cheaper boilers.—*Iron Age.*

The Lahaye Automatic Car-Coupler.

A TRIAL of this device was recently made by the officials of the Reading Railroad, who express a very favorable opinion of the invention, no defect having been developed by the test to which it was subjected.

In using the ordinary coupling, a person is required to stand between the cars whilst they are being backed together, and hold the link and drop the pin at the proper moment. Vastly more accidents happen to railroad employees while coupling cars than in any other way, and to prevent the occurrence of these accidents is the object of the self-coupler. The automatic arrangement is such that the coupling-link is retained in a horizontal position while the cars are approaching each other, and as soon as they meet couple themselves securely together. The self-coupling acts between cars of different heights, and also on the shortest curves, without additional links.

The new coupler is made of cast-iron, excepting the pin and retainer, which are wrought-iron. It consists of a draw-head, with the front or face curving outward, and containing two or more horizontal partitions strung upon an upright bolt to slide vertically in the rear portion of the draw-head, each partition being rounded in front so as to form inclined passages for the easy introduction of the coupling-link. Holes extend through the partitions and the top and bottom of the draw-head for the passage of the coupling-pin. Inside of the draw-head and resting upon the uppermost partition is a "coupling-pin retainer and releaser," in the form of a bent plate fastened by a hinge and having a hole cut in it. When two cars meet, the link in the draw-head of the one car passes either between or below the partitions which moves them upward, when the hinged plate is raised and the hole in it is brought directly in line with the holes in the draw-head and partitions, and the pin, which was supported in an elevated position, is released and drops into all the holes, and thus the coupling is automatically effected. In uncoupling, the pin is raised, freeing the link so that it can be withdrawn on the parting of the cars.—*Reading Eagle.*

A New Car-Seat.

A TOLEDO man has just received a patent for a new and useful invention recently completed by him, for an improvement consisting of a combined seat and desk for railway-cars. The device comprises a stiff spiral spring, situated in the base of an ordinary shaped stool, in such a manner as to receive the full weight of the occupant of the stool without permitting it to touch the floor. The spring serves to break all the jar and jolt caused by the motion of the train, thus affording a perfectly steady position to the small desk attached to the front of the stool. It is claimed by the inventor, after giving a careful test to his invention, that the occupant may write letters or make reckonings while traveling at the rate of thirty miles an hour, with all the ease and legibility attainable in his own counting-room. Should this new device be all that is claimed for it, and we have no reason to doubt its effectiveness, it will prove one of the most valuable inventions of the age for utilizing time and transacting business while performing a journey.—*Exchange.*

Publishers' Notices.

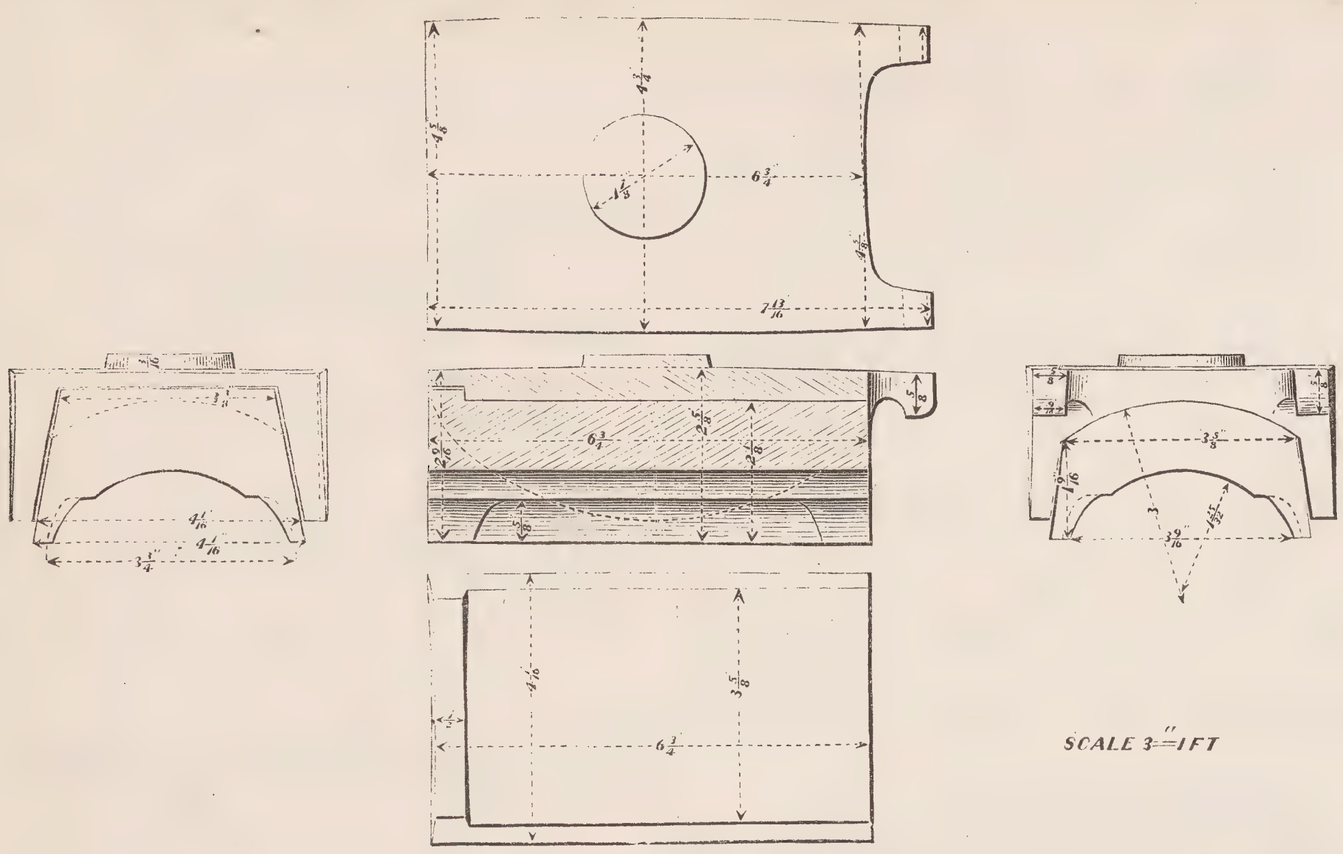
ARTIFICIAL WOOD ORNAMENTS.—The manufacture of this style of cabinet decoration has been brought to such perfection in the imitation of the color and texture of real wood, and also as regards artistic elaboration and design, that it is likely to supersede to a great extent genuine hand-work, especially that kind of carving which has nothing to recommend it except that the material is wood; the work being a mere mechanical repetition of commonplace patterns, executed by unskilled hands and devoid of any real artistic merit. The great undiscriminating public care little about the material of an ornament in this branch of decoration, if its form and color are pleasing, and if it has the requisite durability.

The best specimens we have seen of ornaments formed from compositions made to imitate wood are those manufactured by William B. Gleason & Co., of Boston. They embrace a great variety of patterns suited to cabinet-work, and especially to the interior decoration of passenger-cars of every class, being highly artistic in design and execution, the resources of the artist being expended in perfecting and elaborating the moulds and dies from which the ornaments are produced. Experiments looking to the results now attained were begun by this firm twenty-five years ago; but it is only about five years since that the goods were put upon the market, within which period the business has steadily increased. These ornaments are much cheaper than ordinary wood-carvings, and far more beautiful; they do not warp or crack, will take a polish equal to wood, and are not impaired by dampness or changes of temperature any more than ordinary furniture. The specimens we have seen are an exact match for black-walnut in color, and when put in place, present no noticeable contrast to the genuine wood. The above-named firm is engaged ex, tensively in their manufacture, and keep on hand a great variety specially adapted to car-builders' use. We refer to their advertisement on page 120.

WOOD-CUTTING MACHINERY.—We desire to direct the attention of car-builders and others who have occasion to use this class of machinery, to the Atlantic Works, of Philadelphia, of which Messrs. Richards London & Kelley are the proprietors. They make a specialty of this branch of manufacture, and have the largest assortment of patterns and designs for band-sawing machines in the world, including the latest and most valuable improvements both in machines and blades. The products of these works, including planing, boring, mortising, tenoning, and special machines of all kinds, are in use in all the principal car works of the country, and give uniform satisfaction. See advertisement on third page of cover.

MESSRS. BILLMEYER & SMALLS, Broad and Narrow Gauge Car-Builders, York, Pa., have recently enlarged their already extensive works and added thereto machinery suitable for the construction of every description of cars, and are now prepared to furnish any parts of narrow-gauge rolling-stock, well packed, ready for shipment by cars or vessels to all parts of the world. The trucks are of iron and steel, and may be shipped complete, ready to be placed under car-bodies at place of destination. They have made shipments in this way to South-America, the Islands, and to Washington Territory via the Isthmus and Cape Horn, and by rail to San Francisco.

THE Grand Trunk Railway of Canada has determined to abandon its broad six-feet gauge, and readopt the ordinary narrow one. As a reason for this movement, it is stated that the broad gauge has no merits sufficient to compensate for the greatly increased cost of operating such a road, and in a few years it is probable that all wide roads on this continent will be reduced to the standard gauge.



Standard Journal-Bearing and Key.

We again insert the cut of the standard car journal-bearing and key recommended by the committee of the Master Car-Builders' Association, whose report was published in our March number. We also republish the dimensions of axles and journals recommended in the same report, as follows:

Length of axle, between outside collars, 6 ft. 10 in.
Thickness of collars, $\frac{5}{8}$ inch.
Diameter of axle, at wheel-seat, $4\frac{1}{2}$ inches.
Diameter of axle at centre, 4 inches.
Length of journal, 7 inches.
Diameter of journal, $3\frac{1}{2}$ inches.

A New and Elegant Street-Car.

Messrs. J. G. Brill & Co., of West-Philadelphia, have recently constructed an elegant street-car, which has been placed on the West-Philadelphia Railway line. The exterior is neatly finished, the prevailing color being canary. In the centre is a painting representing a skirmish between some trackmen on the Union Pacific Railway and a number of Indians. The running-gear is of the latest approved pattern, with the anti-friction journal-bearing attached. This bearing is formed by three interlapping rollers, made, of chilled iron, and resting on the top of the journal. These rollers have their centre bearings in the cast-iron journal-casing or housing on which the car-body rests. The rollers having a diameter many times that of the journal, revolve in a corresponding degree more slowly than the journals; and as the journals and rollers revolve in opposite directions, the friction is reduced to its minimum. The superiority of this over the old style of bearing, in the amount of power required to start a car from rest and in the easy motion, recommends it highly. The interior of the car reminds one of the Pullman palace-car, being finished after said model. The ceiling or roof is high, and the ventilation perfect. The woodwork is bird's-eye maple, buttonwood, (set in panels,) and walnut. The mountings are all in silver plate. At each end is a handsome mirror, and the upholstering has been done in red plush. The vehicle looks more like a miniature steam railway "palace-coach" than one intended for street railways.

The magnificent new depot of the Lake Shore and Michigan Southern and the Rock Island and Pacific Railroads, on Van Buren street, between Sherman street and Pacific avenue, Chicago, is now approaching completion. The structure will be fit for occupancy some time next month. It is more massive and imposing in appearance than the ante-fire depot, but otherwise presents the general characteristics of that edifice. The cost is close on $1,000,000. In point of appearance, the structure is second to none in the United States.

Mr. F. H. Whitman, of Portland, Me., has devised a plan to render cedar and other soft woods more serviceable for rail-ties, by inserting, at the point where the rail rests, a section of oak plank an inch and a half thick. Cedar, while it resists decay longer than any other wood, is soft and weak in fibre, and rapidly gives way under the direct pressure of the rail; but, if protected in the way indicated, will outlast any other wood tie. If the section of oak wears out before the cedar, it can be replaced by a new one without any disturbance of the road-bed.

The Missouri Car and Foundry Company, at St. Louis, manufactured during 1872 3200 freight-cars. The company now employs about three hundred men, and the capacity of the works is twelve box-cars per day. The company's foundry is now turning out 125 car-wheels per day, besides the other castings used in the manufacture of cars.

Mr. W. H. Herrick has purchased thirty acres of land at Oswego, N. Y., having a front of four hundred feet on the Delaware, Lackawanna and Western and eight hundred feet on the Lake Ontario Shore Road, and is preparing to put up shops large enough to build ten box-cars per week.

Thirty-six new members have been added to the National Railway Association since their January meeting in St. Louis, making the present membership about 120. A good attendance at the May meeting in New-York is earnestly desired.

The Pittsburg, Fort Wayne, and Chicago Railway Company have completed 126 miles of double track—steel rails. Sixty-four miles additional have been contracted for, and will be laid with 60-pound Bessemer rails made by the Cambria Iron-Works.

A new company has been organized at Petersburg, Va., by the name of the Petersburg Car-Works Company, for the manufacture of railroad cars. The capital stock is $100,000, to be increased hereafter to $500,000.

The Litchfield Car-Works have recently manufactured twelve caboose-cars of an improved pattern, for the Iron Mountain Road. They are each thirty feet long by nine feet wide, inside measurement.

The Harrisburg Car Manufacturing Company, at Harrisburg, Pa., is now filling orders for stock-cars for the New-York Central and Hudson River Road; gondolas for the Pennsylvania Railroad; iron-tank oil-cars for the Union Tank Line, and eight-wheel iron-bottom coal dump cars for the Westmoreland Coal Company. Twelve cars per day are turned out.

The Cummings Car-Works, at West-Bergen, N. J., are building fifteen passenger-cars for the New-York and Oswego Midland Road. The works have just completed twenty-two cars for P. T. Barnum's show.

New Publications.

The American Railway and Supply Directory for 1873.—We have received from the publishers, Messrs. Greenough, Jones & Co., Boston, a copy of this very complete and valuable work, for which we tender our thanks. So far as we have been able to test its accuracy, we have found it reliable. It contains, in addition to the usual information to be found in railway manuals, a very extensive list of supply dealers, and also alphabetical lists of master mechanics and master car-builders. It has a well-arranged index, is printed in clear type, and is in all respects a volume deserving of patronage.

The Cabinet Maker has been much enlarged and improved in its appearance. We are glad to note such substantial evidence of prosperity and deserved appreciation in this valuable trade journal.

The Hub for April comes to us in an improved form, its size being considerably reduced to suit the convenience of readers. The number of pages is increased, so that in its new form it contains the same quantity of matter as before, but is less unwieldy and more easily handled. Its illustrations and typography are fully up to its usual standard of excellence.

The Railway Chronicle.—We have received a specimen number of the first issue of this publication. It contains eight pages, is beautifully printed on fine tinted paper, and is devoted to railway intelligence and progress. It is published weekly by the Railway Printing Company, Boston. Terms, $3 a year.

Facetiæ.

"Is dem bells ringin' for fire, Tiberius?" "No, sir! Dey got plenty o' fire; dem bells is ringin' for water."

What is the difference between the entrance to a barn and a loafer? One is a barn door and the other is a darn bore.

A Buffalo paper announces that by the recent burning of an ice-house there, 20,000 tons of ice were "reduced to ashes."

"An't it wicked to rob dis here roost, Jim?" "Dat's a great moral question, Gumbo; we an't got time to argue it now—hand down another pullet."

An Iowa clergyman has four boys, and the youngest is named Doxology, because he was the last of the hims.

A Southern paper, which has heard that fish is good brain-food, appeals to the hotel-keepers to bountifully supply the members of the Legislature therewith.

The latest verdict recorded was upon a gentleman who expired in a fit of inebriation. The jury returned: "Death by hanging—round a grog-shop."

A Portland clergyman startled his flock on Sunday morning by telling them that "h—l was not so full of men and women as men and women were full of h—l."

A very wealthy farmer of Ohio County, Kentucky, has this "notis" pasted up in his field, "If any man's or woman's cows or oxens gits in these here oats, his or her tail will be cut off as the case may be."

"I have no luck in fishing; I never could persuade a fish to bite," said a young exquisite. "Try your power on a cross dog," remarked a rough bystander, "and see if yer don't have better luck."

An Arkansas artist carved a sleeping lion in marble, and took it to the county fair for a premium. The award was thusly: "James McGill—first premium for a beautiful bull-pup carved in marble."

Mark Twain, in speaking of cannibalism, grows serious for once, and solemnly declares that, for his own part, he "would rather go hungry for two days than eat an old personal friend."

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AND ALL METALS NECESSARY FOR

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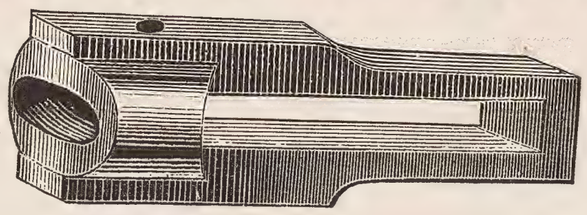

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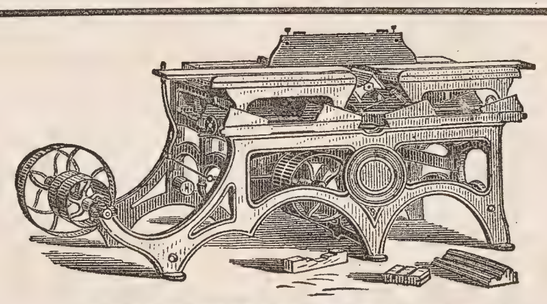

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F			
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G			
Galveston, Harrisburg & San Antonio	Jno. G. Coulon		Galveston, Texas.
Grand Tower & Carbondale	Hugh Smith	Hugh Smith	Grand Tower, Ill.
Grand Trunk		Warren Noyes	Gorham, Me.
Grand Trunk	†Richard Eaton	J. W. W. McWood.	Montreal, Canada.
Grand Trunk		Howard Fry	Sherbrooke, Can.
Grand Trunk		B. J. Mitchell	Portland, Me.
Galveston, Houston & Henderson	Wm. Macbeth	Wm. Macbeth	Galveston, Texas.
Grand Rapids & Indiana	J. M. Boon		Fort Wayne, Ind.
Great Western of Canada	†Wm. A. Robinson	F. Childs	Hamilton, Canada.
Georgia	William Hardman.	T. M. Preval	Augusta, Ga.
Green Bay & Lake Pepin	I. H. Erwin		Green Bay, Wis.
Greenville & Columbia	J. T. Price	J. T. Price	Helena, S. C.
H			
Harlem Extension	George W. Blanchard		Rutland, Vt.
Harlem Extension		C. S. Clapp	Bennington, Vt.
Hanover Branch	John J. Bingley	Henry Britcher	Hanover, Pa.
Hartford & New-Haven	John O. Chapman	F. Leppense	Hartford, Ct.
Hannibal & St. Joseph	H. A. Towne.	H. C. Whiting	Hannibal, Mo.
Hartford, Providence & Fishkill	Edwin Garfield	V. D. Perry	Hartford, Ct.
Hackensack & New-York	Abra'm Angausen		Hackensack, N. J.
Housatonic	C. R. Morris	J. J. Ferris	Bridgeport, Ct.
Houston & Texas Central	§W. H. Purdy	W. H. Purdy	Houston, Texas.
Houghton & Ontonagon			L'Anse, Mich.
Houston Tap & Brazoria	T. J. Shellhorn	T. J. Shellhorn	Houston, Texas.
Huntington & Broad-Top Mountain	J. Salisbury	M. Tellerhoof	Saxton, Pa.
Hempfield	T. Marsh		Wheeling, Va.
Houston & Great Northern	T. J. Shellhorn	T. J. Shellhorn	Houston, Texas.
I			
Indianapolis, Cincinnati & Lafayette	J. S. Patterson	S. Griffith	Cincinnati, Ohio.
Indianapolis, Peru & Chicago	John McKenna	John McKenna	Peru, Ind.
Illinois Central	**S. J. Hayes	H. O. Wadlie	Chicago, Ill.
Chicago Division	Henry Schlacks		Chicago, Ill.
South Division	David Oxley		Centralia, Ill.
North Division	J. B. Edams		Amboy, Ill
Iowa Division	Thomas W. Place		Waterloo, Iowa.
Iowa & Missouri State Line			Farmington, Iowa.
Iron	Perry Scott	Clem. Roetling	Ironton, Ohio.
Indianapolis & St. Louis	Wm. Barkla	R. B. More	Mattoon, Ill.
Indianapolis, Bloomington & Western	Tho. V. Losee	Tho. V. Losee	Urbana, Ill.
Ionia & Lansing	H. Loughlin		Lansing, Mich.
Indianapolis & Vincennes	A. E. Allcott		Indianapolis, Ia.
Ithaca & Athens	F. A. Brown		Ithaca, N. Y.
J			
Jeffersonville, Madison & Indiana	Reuben Wells		Jeffersonville, Ind.
K			
Kansas Central	John Davis		Leavenworth, Kan.
Knox & Lincoln	§§E. R. Hamlin	Benj. Soule	Bath, Maine.
Kentucky Central	J. R. Ledyard	J. L. Hackathorn	Covington, Ky.
Knoxville & Charleston			Knoxville, Tenn.
Kansas Pacific	**L. H. Waugh		Wyandotte, Kansas.
Denver Pacific Div	**L. H. Waugh		Wyandotte, Kansas.
Denver & Boulder Valley Div	**L. H. Waugh		Wyandotte, Kansas.
Junction City & Ft. Kearney Div	**L. H. Waugh		Wyandotte, Kansas.
Arkansas Valley Div	**L. H. Waugh.		Wyandotte, Kansas.
Kalamazoo, Allegan & Grand Rapids			Kalamazoo, Mich.
Kansas City, St. Joseph & Council Bluff	H. L. Cooper	J. Aylesbury	St. Joseph, Mo.
King's Mountain	E. Thomas.	E. Thomas	Chester, S. C.
L			
Lake Erie & Louisville	John Pero		Fremont, Ohio.
Lake Superior & Mississippi	R. B. Small		St. Paul, Minn.
Lackawanna & Bloomsburg	Chas. Graham	Chas. Graham	Kingston, Pa.
Lehigh Valley	John I. Kinsey	E. R. Brown	South-Easton, Pa.
Lehigh Valley	P. Hofecker		Weatherly, Pa.
Lehigh Valley	A. Mitchell	Mauch Chunk, Pa.	Delano, Pa.
Lehigh Valley	D. Clark		Hazleton, Pa.
Leavenworth, Lawrence & Gal	S. M. Philbrick		Lawrence, Kansas.
Lexington & Big Sandy	Fred. Weber	R. Brainard	Ashland, Ky.

Railroad.	*Master-Mechanic.*	*Master-Car-Builder.*	*Residence.*
Little Rock & Fort Smith	A. Klohs		Little Rock, Ark.
Little Miami	J. H. Setchel		Cincinnati, Ohio.
London & Port Stanley			London, C. W.
Louisville, New-Albany & Chicago	Jacob Losey	Geo. Helfrich	New-Albany, Ind.
Long Island	Chs. A. Thompson.		Hunter's Point, L I.
Louisville, Cincinnati & Lexington	E B. Gibbs	S. S. Pilson	Louisville, Ky.
Louisville & Nashville	†Thatcher Perkins		Louisville, Ky.
Louisville & Nashville	D. P. Rennie	Isaac M. Owens	Louisville, Ky.
Louisville & Nashville	Jas. Montgomery		Bowling Green, Ky.
Nashville & Decatur Division	John Skidmore		Nashville, Tenn.
South & North Ala. Div.	Thos. Jeffers	W. L. Gude	Birmingham, Ala.
South & North Ala. Div	C. H. Beale		Montgomery, Ala.
Memphis & Ohio Div.	Thos. Walsh	R. M. C. Parker	Memphis, Tenn.
Lake Shore & Michigan Southern	‡James Sedgley	††John Kirby	Cleveland, Ohio
Michigan Southern Division	William Hill		Elkhart, Ind.
" " "		S. S. Knapp	Adrian, Mich.
Toledo Division	Geo. H. Tier	Frank O. Bray	Norwalk. Ohio.
Erie Division	L. O. Gassett	J. Withyecombe.	Cleveland Ohio.
Buffalo Division	W. L. Wallace	A. Robson	Buffalo. N Y.
Lake Shore & Tuscarawas Valley	Charles Fellows	J. D. McIlwain	Black River. Ohio.
Lake Ontario Shore	J. C. Schermerhorn.	J. C. Schermerhorn.	Oswego, N. Y.

M

Marquette, Houghton & Ontonagon	A. P. Burroughs	H. D. Lyons	Marquette, Mich.
Macon & Augusta			Macon, Ga.
Maine Central	J. H. Philbrick	J. H. Philbrick	Waterville, Me.
Macon & Western	D. M. Gogul	James A. Knight.	Macon, Ga.
Manchester & Lawrence	Chas. L. Eastman.	M. W. Dickerman.	Concord, N. H.
Marietta & Pittsburg	W. J. Adams		Marietta, Ohio.
Maryland & Delaware	J. L. Caldwell		Easton, Md.
Macon & Brunswick	M. Thornton	M Thornton	Macon, Ga.
Marietta & Cincinnati	E. Bosley	E. Bosley	Chillicothe, Ohio.
Memphis & Little Rock	N. Greener	C. W. Wooldridge	Huntsville, Ark.
Memphis & Charleston	A. Ross	A W. Drew	Memphis. Tenn.
Memphis & Charleston	H. N. Burford	Fabien Varin	Huntsville, Ala.
Mineral Point	Robert Hay		Mineral Point. Wis.
Mississippi & Tennessee	Geo. Hazenger	J. Riny	Memphis, Tenn.
Mississippi Central	Henry Gibbon.	John E. Becton	Water Valley. Miss
Maryland & Delaware	Samuel Peters		Greensboro, Md.
Mississippi, Gains. & Tus			Gainsville, Ala.
Midland Pacific			Nebraska City, Neb.
Milwaukee & St. Paul	T. S. Davis	Wm. E. Kittrege.	Milwaukee, Wis.
Milwaukee & St. Paul		John Baillie	Milwaukee, Wis.
Milwaukee & St. Paul	J. Pattee	D. F. Wilson	Minneapolis. Minn.
Hastings & Dakota Division	C. C. Clements		Hastings. Minn.
Michigan Central	A. S. Sweet, Jr.	J. B. Sutherland.	Detroit, Mich.
Grand River Valley Division		James Potts	Jackson, Mich.
J'kson, Lans'g & Saginaw Div.	Andrew Wilson	Andrew Wilson	Jackson Mich.
Montgomery & West-Point	J. McVey	J T. Daniels	Montgomery, Ala.
Montgomery & Eufaula	I. W. Hewlet	T. J. Burton	Montgomery, Ala.
Mobile & Montgomery	James McFarland.	L. Barham	Montgomery, Ala
Mobile & Girard	C. D. Wall		Girard. Ala.
Mobile & Ohio	L. J. Fleming / B. S. Skates	John McHugh. / B. S. Skates	Mobile, Ala. / Whistler, Ala.
Missouri River. Fort Scott & Gulf	John S. McCrum		Kansas City, Mo.
Missouri River, Fort Scott & Gulf		Josiah Stahl	Wyandotte, Kan.
Missouri, Kansas & Texas		J. Townsend	Sedalia, Mo.
Missouri, Iowa & Nebraska	Geo. Adams	Geo. Adams	Alexandria, Mo.

N

Nashville & Chattanooga	John U. Eastman.	J. G. Sawyer	Nashville. Tenn.
New-Bedford & Taunton	Robert Chase	Robert Chase	New-Bedford, Mass.
New-Canaan			New Canaan, Ct.
New-Brunswick & Canada	T. Armstrong	T. Armstrong	S'nt Andrew's, N.B.
New-Haven & Northampton	Henry Fox.	Henry Fox.	New-Haven, Ct.
New-York, Kingston & Syracuse	A. Q. Mackenbush.	G. Dikeman	Syracuse, N. Y.
New-York & Harlem.	Wm. M. Strong	Leander Garey	New-York.
New-York Central & Hudson River	‡G. B. Van Vorst		Albany. N. Y.
New-York Central & Hudson River	Henry Watkeys		Syracuse, N. Y.
New-York Central & Hudson River	Amos Gould		Rochester, N. Y.
New-York Central & Hudson River	Jas. Butman	Wm. Johnson	Buffalo, N. Y.
New-York Central & Hudson River	Wm. Buchanan	John McKenna	New-York.
New-York Central & Hudson River	John Dikeman		East-Albany, N. Y.
New-York Central & Hudson River		Joseph Jones	West-Albany, N. Y.
New-York Central & Hudson River		George Rowe	Niagara Falls, N.Y.
New-York, Boston & Montreal		H. A. Webster	E. Tarrytown, N.Y.
New-York & Oswego Midland	§Wm. H. Griggs	Wm. H Griggs	Oswego, N. Y.
New-Jersey Division	J. F. Sechler		Wortendyke, N. J.
New-Jersey Division		J. A. Read	Pompton, N. J.
New-York, Providence & Boston.	Jas. H. Anderson.	Jas H. Anderson.	Providence, R. I.
New-York, New-Haven & Hartford	§§H. Kittendorf	James Denver	New-Haven, Ct.
New-York, New-Haven & Hartford	J. O. Chapman	F. Leppens	Hartford, Ct.
New-Jersey Southern	Rufus Blodgett.		Manchester, N. J.
New-Haven & Derby			New-Haven, Ct.
New-Orleans, Opelousas & Gt. Western.	John McCluskey.	Matthew Nolan	Algiers, La.
New-Lisbon			Leetonia, Ohio.
New-Orleans & Ohio	John R. Jordan	John R. Jordan	Paducah, Ky.
New-Orleans, Jackson & Gt. Northern.	N. Greener	N. Greener	New-Orleans, La.
New-Haven, Hartford & Springfield			Hartford, Ct.
Naugatuck	Henry Hanford	George W. Gray.	Bridgeport, Ct.
Nova Scotia	W. Johnson		Bedford, N. S.
North-Carolina	Rufus D. Wade	B. G. Sergeant	Co. Shops, N. C.
New Orleans, Mobile & Texas	Josiah Bettis	W. H. Johnson	Mobile, Ala.
Northern Central	C. M. Lewis		Baltimore, Md.
Northern Central		G. W. Demarest.	York, Pa.
North-Lebanon		Henry B. Oves.	Lebanon. Pa.
North-Pennsylvania	Franklin Roop	Franklin Roop	Philadelphia, Pa.
North-Eastern	D. W. Haines	A. M. Corrie	Florence, S. C.
Northern	James W. Lander.	Albert Langmaid.	Concord, N. H.
Northern of New-Jersey	T. W. Demorest		New-York.
Norwich & Worcester	Richard Colburn.	G. R. Bentley	Norwich, Ct.
Northern of Canada	P. Clark.	P. Clark	Toronto, Can.
Northern Pacific	§§Geo. W. Cushing		St. Paul, Minn.

O

Old Colony & Newport	J. K. Taylor	A. Gleason	Boston, Mass.
Orange, Alexandria & Manassas	James E. Waddey	John T. Nalls	Alexandria, Va.
Oil City & Pithole	George Thompson		Pithole, Pa.
Oil Creek & Alleghany River	J. S. McElroy	Jacob Williams	Corry, Pa.
Oil Creek & Alleghany	H.J.Bookhammer.	John Monks	Oil City, Pa.
Ohio & Mississippi		G.Hibbard	Cochran, Ind.
East Division	A. Thompson		Cochran, Ind.
West Division	H. Elliott	G. H. Thompson	East St. Louis, Ill.
Oregon & California	§§J. Brandt.		Portland, Oregon.
Owensburg & Russellville	J. R. Osborne		Owensburg, Ky.

P

Paducah & Memphis	J. D. Linning		Paducah, Ky.
Painesville & Youngstown	G. R. Crane		Painesville, Ohio.
Paris & Decatur	John G. Clifford	G. Clifford	Paris, Ill.
Panama	Chas. E. Stewart	J. G. Wilson	Aspinwall, N. G.
Pacific of Missouri	§§John Hewitt	John Hewitt	St. Louis, Mo.
Pennsylvania	§§F. Thomson		Altoona, Pa.
Pennsylvania	H. D. Garrett	I. W. Van Houten.	W. Philadelphia, Pa.
Pennsylvania	E. L Caum	Samuel W. Myers.	Harrisburg, Pa.
Pennsylvania	G. W. Strattan	John P. Levan	Altoona, Pa.
Pennsylvania	D. O. Shaver	R. S. Ramsey	Pittsburg, Pa.
New-Jersey Division	John Headden	David H. Baker.	Jersey City, N. J.
West-Penn. Division	C. B. Street.	James F. Elder	Blairsville, Pa.

Railroad.	*Master-Mechanic.*	*Master-Car-Builder.*	*Residence.*
Philadelphia and Erie	Martin Walls		Sunbury, Pa.
	W. L. Forster		Renovo, Pa.
	W. L. Holman		Kane, Pa.
	W. T. Smith.		Erie, Pa.
	§§T. N. Ely		Erie, Pa.
Philadelphia, Wilmington & Baltimore	S. A. Hodgman	Wm. T. Worth	Wilmington, Del.
Philadelphia & Reading	L. B. Paxson	Aaron Steinbach.	Reading, Pa.
Germantown & Norris'n Div.	Jackson Richards		Philadelphia, Pa.
Philadelphia & Baltimore Central	S. D. Danfield.	Samuel D. Danfield.	Chester, Pa.
Pittsburgh, Cincinnati & St. Louis			
Pittsburgh & Columbus Division.	E. Pierce		Dennison, Ohio.
Pittsburgh & Columbus Division		James McGee	Steubenville, Ohio.
Little Miami Division		M. P. Ford	Columbus, Ohio.
Little Miami Division	J. H. Setchel		Pendleton. Ohio.
Col., Cin. & Ind. Division	Robert Curtis	Tho. Chamberlain.	Columbus, Ohio.
Col., Cin. & Ind. Division	Geo. H. Prescott	Geo. H. Prescott	Logansport, Ind.
Peoria & Rock Island	Theo. Mosher		Peoria, Ill.
Pittsburg. Fort Wayne & Chicago	S. M. Cummings.	John Marquis	Alleghany, Pa.
Pittsburg, Fort Wayne & Chicago	J. M. Boon.	J. M. Boon	Fort Wayne, Ind.
Pittsburg, Fort Wayne & Chicago		J. J. Kirkland	Crestline, Ohio.
Pittsburg, Washington & Baltimore	A. S. Kinzie		Connellsville, Pa.
Peoria, Pekin & Jacksonville	R. F. Hurd	R. F. Hurd	Pekin, Ill.
Peninsular	T. G. Templeton.		Battle Creek, Mich
Portland & Rochester	John G. Brady	John G. Brady	Portland, Me.
Portland & Kennebec	John Ellis	C. H. Kenison	Augusta. Me.
Portland & Oxford Central.	Geo. W. Battles.	Geo. W. Battles.	Buckfield, Me.
Portland, Saco & Portsmouth.	John Donnell		Portland. Me.
Port Royal.	C. W. Furber	E. Hubard	Port Royal, S. C.
Port Hope, Lindsay & Beaverton	H. G. Taylor	H. G. Taylor	Port Hope, Can.
Port Huron & Lake Michigan	R. C. Stewart	R. C. Stewart	Port Huron, Mich.
Providence, Warren & Bristol	Rufus Smith	J. Brightman.	Bristol, R. I.
Portsmouth, Gt. Falls & Monmouth.	James Tucker	E. Fall	Union Village, N.H.
Petersburg & Weldon	R. B. Andrews	Alex. Wright	Petersburg, Va.
Providence & Worcester.	Joseph Kelly.	Olney L Smith	Providence, R. I.
Poughkeepsie & Eastern	John L. Driscoll.	Jerry Wigg	Poughkeepsie, N. Y.

R

Raleigh & Gaston.	J. B. Gayle	J. B. Gayle	Raleigh, N. C.
Richmond, Fredericksburg & Potomac.	H. Kuhn	W. H. Trainham.	Richmond, Va.
Richmond, Danville & Piedmont	John McFarland.	H, Longest	Richmond, Va.
Richmond & Petersburg	John O'Brien	H. L. Carter	Richmond, Va.
Richmond & York River.	C. H. Harris	J. L. Thompson.	Richmond. Va.
Rome, Watertown & Ogdensburg	Wm. Jackson	H. H. Sessions	Rome, N. Y.
Reading & Columbia	B. Van Lew		Columbia, Pa.
Rome, Georgia.	O. W. Harbin.	O. W. Harbin.	Rome. Ga.
Rochester & Genesee Valley.	M. E. Brown.	M. Wilder	Buffalo, N. Y.
Rockford, Rock Island & St. Louis	Joseph Elder.	J. F. Nolte	Beardstown, Ill.

S

Saginaw Valley & St. Louis	W . S. Thompson		Saginaw, Mich.
Southern Pacific of California	J. P. Wilson	F. N. Bellisle	San Francisco. Cal.
St. Croix & Lake Superior			New-York City.
St. Croix & Penobscot	Edward Bolton	A G. Page	Milltown, Me.
St. Lawrence & Ottawa	Calvin Dame.	Calvin Dame	Prescott. Canada.
St. Louis & Iron Mountain	O. A. Haynes	Oscar Doolittle	Carondelet, Mo.
St. Joseph & Denver City	E. Sleppy		St. Joseph, Mo.
San Antonio & Mexican Gulf	W. T. Bingham		Victoria, Texas.
South Side of Long Island	Geo. H. Griggs	M. Heitzman	Williamsburg, L. I.
St. Paul & Pacific	J. C. Monroe	T. W. Heathcote	St. Paul, Minn.
St. Paul & Sioux City	F. C. Butterfield.	J. W. Lydic.	Shakopee, Minn.
St. Louis Vandalia, T. Haute & Ind.	C. R. Peddle	H. Kirmse	Terre Haute, Ind.
Indianapolis Division	Wm. Riley		Terre Haute, Ind.
Vandalia Division	A. J. Sanborn.		Effingham, Ind.
South-Carolina	W. B. Smith	John Reed	Charleston, S. C.
Southern Central	Chas. G. Brown.	H. Mooney	Auburn, N. Y.
Southern Minnesota	Wm. Lininger		Wells, Minn.
South-Western of Georgia	C. D. Wall		Columbus, Ga.
South-Western of Georgia	D. M.Gogul	James A. Knight.	Macon. Ga.
South Shore	Warren E Ray		Cohasset, Mass.
Stanstead. Shefford & Chambly	W. H. Smith		Waterloo. C. E.
Seaboard & Roanoke	§J. B. Pendleton.	J. B. Pendleton.	Portsmouth, Va.
Stonington & Providence	J. H. Anderson.	J. H. Anderson.	Providence, R. I.
Selma & Gulf	Wm. T. Daughtrey		Selma, Ala.
Selma, Rome & Dalton.	A. G. Maynes.	W W. Peirce	Selma, Ala.
Sioux City & Pacific	C. H. Foster		Missouri Val., Iowa.
Spartanburg & Union	J. N. Benner	Jacob Rice	Union C. H., S. C.
Sheboygan & Fond du Lac	A. F. Wallace.	A. F. Wallace.	Sheboygan, Wis.
Sullivan & Erie			Tonawanda, Pa.
Syracuse, Binghamton & New-York	H. H. Dawson	David Burling	Syracuse, N. Y.
Syracuse Northern	W. Garrison.	L. W. Smith	Syracuse, N. Y.
Sycamore & Cortland			Sycamore, Ill.
St. Louis, Alton & Terre Haute.	**Beriah Warren		St. Louis, Mo.
St. Louis & South-Eastern.	L. B. Salisbury		Mt. Vernon, Ill.
Nashville Division	H. M. Smith		Nashville, Tenn.
St. Louis, Kansas City & Northern.	H. S. Smith	C. S. Buck	Moberly, Mo.

T

Taunton Branch.			Taunton, Mass.
Tioga	Peres Bonny	D. H. Stratton	Blossburg. Pa
Texas & New-Orleans.	R. B. Baer		Houston, Texas.
Tennessee & Pacific.	William McKeand.	William McKeand.	Nashville, Tenn.
Toledo, Wabash & Western	W. F. Ray		Fort Wayne, Ind.
Toledo, Wabash & Western		David Hoit	Toledo. Ohio.
Toledo, Wabash & Western	T. G. Gorman		Springfield, Ill.
Toledo, Peoria & Warsaw	A. H. De Clerq	R. M. Hemphill	Peoria. Ill.
Troy & Boston	Foster Church	R. V. Coon	Troy, N. Y.
Toronto, Grey & Bruce.		Wm. Bowstead	Toronto, Can.
Toronto & Nipissing	J. Haggus		Toronto, Canada.

U

Union Pacific	§I. H Congdon	Geo. E. Stevens	Omaha, Nebraska
Utica & Black River	Wm. E. Granger.	David James	Utica, N. Y.
Utica, Chenango & Susquehanna	C. H. Brown		Utica, N. Y.

V

Vicksburg & Brunswick	James Boon	J. A. Knight	Eufaula, Ala.
Vicksburg & Meridian	Jas. B. Brown		Vicksburg, Miss.
Vineland			Vineland, N. J.
Vermont Central	J. M. Foss	J. M. Foss	St. Albans, Vt.
Rutland Division	N. L. Davis	F. M. Sessions	Rutland, Vt.
New-London Northern Division.	J. W. Dow	S. W. Caulkins	New-London, Ct.
Ogdensburg & L. Champlain Div.	William A. Short.	J. R. Ames	Malone, N. Y.
Vermont & Massachusetts	D. T. Davis	Jacob Marsh	Fitchburg, Mass.

W

Western Union	John Taylor	E. A. Eddy	Racine, Wis.
Wicomico & Pocomoke			Berlin, Md.
Wilmington, Charlotte & Rutherford	W. A. Gill	Thomas Myers	Laurenburg, N. C.
Wilmington, Columbia & Augusta	George Hall	W. J. Calais	Wilmington, N. C.
Westchester & Philadelphia	John Moyer	N. Pawling	Philadelphia. Pa.
Wilmington & Weldon	John Bissit.	John Bissit	Wilmington, N. C.
Wilmington & Western			Wilmington, Del.
West-Jersey	W. McAllister	C. C. Williams	Camden, N. J.
Western Maryland	Wm. Lannan	J. H. Nussear	Union Bridge, Md.
Winona & St. Peter	F. C. Ford	H. L. Preston	Winona, Minn.
Western North-Carolina	E. H. Marsh	E. H. Marsh	Salisbury, N. C.
Western R. R. N. C	M. W. Atkinson.	M. W. Atkinson	Fayetteville, N. C.
West-Feliciana	R. C. Brower	Wm. Grawling	Woodville, Miss.
Western & Atlantic	John H. Flynn	John Sherman	Atlanta, Ga.
Worcester & Nashua	Albert Griggs.	Albert Griggs	Worcester, Mass.
Welland	James Taylor	James Chase	St. Catharine, C. W.
Washington & Ohio	Edward Dunn.	Joshua Harrison.	Alexandria. Va.
White Water Valley	A. W. Britton		Harrison, Ohio.

DIRECTORY
OF
Railway Superintendents and Purchasing Agents
THROUGHOUT THE UNITED STATES AND CANADA.

REFERENCES.—* General Manager. † Managing Director.

Railroad.	*Superintendent.*	*Purchasing Agent.*	*Residence.*
A			
Arkansas Central	James E. Gregg		Helena, Ark.
Alabama Central	John M. Bridges		Montgomery, Ala.
Albany & Susquehanna	H. A. Fonda	D. W. C. Ramsey.	Albany, N. Y.
Alexandria & Fredericksburg	E. L. Dubarry		Washington, D. C.
Alexandria, Nebraska & Iowa			
Atchison, Topeka & Santa Fe	G. H. Nettleton	G. H. Nettleton	Topeka, Kansas.
Atchison & Nebraska	C. C. Smith	C. C. Smith	Atchison, Kansas.
Alabama & Chattanooga	R. Cravath	J. C. Stanton, Jr.	Chattanooga, Tenn.
Atlanta & West-Point	L. P. Grant		Atlanta, Ga.
Atlantic & Gulf	H. S. Haines		Savannah, Ga.
Atlantic & North-Carolina	E. G. Stanley		New-Berne, N. C.
Atlantic & Great-Western	I. D. Barton	R. B. Browne	Meadville, Pa.
First and Second Division	A. L. Dunbar	"	"
Third and Fourth "	T. A. Phillips		Galion, Ohio.
Mahoning Division	J. M. Ferris		Cleveland, Ohio.
Atlantic & Pacific	A. A. Talmage	W. H. Patriarche.	St. Louis, Mo.
Atlantic, Mississippi & Ohio	Henry Fink		Lynchburg, Va.
Norfolk & Petersburg Division			
South-Side Division			
Virginia & Tennessee Division			
Allegheny Valley	J. J. Lawrence	J. J. Lawrence	Pittsburg, Pa.
Adirondack	C. H. Ballard		Saratoga, N. Y.
B			
Baltimore & Ohio	Thos. L. Sharp	Benj. Williams.	Baltimore, Md.
Central Ohio & Lake Erie Div.	W. C. Quincy		Columbus, Ohio.
Bangor & Piscataquis	L. H. Eaton	L. H. Eaton	Bangor, Maine.
Boston & Albany	C. O. Russell		Springfield, Mass.
Boston & Providence	A. A. Folsom	A. A. Folsom	Boston, Mass.
Boston, Clinton & Fitchburg	H. A. Blood		Fitchburg, Mass.
Boston, Concord & Montreal	J. A. Dodge	Lyon & Vose	Boston, Mass.
Boston & Maine	William Merritt.	M. E. Wood	Boston, Mass.
Boston, Lowell & Nashua	J. B. Winslow		Boston, Mass.
Blossburg, Corning & Tioga	A. H. Gorton	R. J. Burnham	Watkins, N. Y.
Brockville & Ottawa	H. Abbott		Brockville, Canada.
Blue Ridge	M. L. D. Gaillard		Pendleton, S. C.
Burlington & Missouri River	*C. E. Perkins	C. F. Morse	Burlington, Iowa.
Burlington & Missouri River (in Neb.)	C. F. Morse		Plattsmouth, Neb.
Burlington, Cedar Rapids & Minnesota	William Greene.	S. L. Dows	Cedar Rapids, Ia.
Buffalo, New-York & Philadelphia	J. D. Yeomans		Buffalo, N. Y.
Boston, Hartford & Erie	Wm. M. Parker		Boston, Mass.
Worcester Division			
Woonsocket "			
Buffalo, Corry & Pittsburg	H. H. Potter	N. M. Whitside	Corry, Pa.
C			
Camden & Atlantic	E. Collings		Camden, N. J.
Catasauqua & Fogelsville	C. W. Chapman.	C. W. Chapman	Catasauqua, Pa.
Carrollton & Oneida	H. A. Stidger		Carrollton, Ohio.
Chesapeake & Ohio	A. H. Perry	J. A. Netherland.	Richmond, Va.
Cheraw & Darlington	S. S. Solomon		Florence, S. C.
Cheshire	R. Stewart	H. H. Stone	Keene, N. H.
Charlotte, Columbia & Augusta			
Chicago & North-Western	Marvin Hughitt.	R. W. Hamer	Chicago, Ill.
Wisconsin & Mill. Division	Arthur A. Hobert		Chicago, Ill.
Peninsula Division	S. C. Baldwin		Escanaba, Mich.
Madison Division	O. Beardslee		Madison, Wis.
Kenosha Division	O. Beardslee		Madison, Wis.
Galena Division	Edward J. Cuyler		Chicago, Ill.
Eastern Iowa Division	John B. Watkins		Clinton, Iowa.
Western Iowa Division	John A. Head		Boone, Iowa
Chicago & Alton	J. C. McMullen	A. V. Hartwell.	Chicago, Ill.
Chicago, Burlington & Quincy	R. Harris	H. J. Higgins	Chicago, Ill.
Eastern and Middle Division	C. H. Chappel		Aurora, Ill.
Galesburg Division	H. Hitchcock		Galesburg, Ill
Quincy Division	N. D. Munson		Quincy, Ill.
Buda Division			
Chicago, Cincinnati & Louisville			
Chicago, Dubuque & Minnesota	C. H. Hudson	F. T. Massey	Dubuque, Iowa.
Chicago, Clinton & Dubuque	C. H. Hudson		
Chicago, Rock Island & Pacific	Hugh Riddle.	A. Manvel	Chicago, Ill.
Illinois Division			Chicago, Ill.
Iowa Division			Davenport, Iowa.
South-Western Branch			
Chicago & Michigan Lake Shore	A. H. Morrison.	Wm. R. Morrison.	St. Joseph, Mich.
Chicago, Danville & Vincennes	J. E. Young	C. B. Mansfield.	Chicago, Ill.
Chicago & Canada Southern			
Cleveland, Columbus, Cincinnati & Ind.	E. S. Flint		Cleveland, Ohio
Indianapolis Division	C. C. Gale	A. G. Wright	Indianapolis, Ind.
Columbus Division	Robert Blee		Cleveland, Ohio.
Cincinnati Division.	R. H. Shoemaker		Cincinnati, Ohio.
Cleveland & Pittsburg	*J. N. McCullough		Pittsburg, Pa.
Cleveland, Mt. Vernon & Delaware	G. A. Jones		Akron, Ohio.
Cobourg, Peterboro & Marmora	James R. Barber.	Jas. R. Barber	Cobourg, Can.
Cincinnati & Martinsville	T. C. Burnside		Franklin, Ind.
Cincinnati & Terre Haute	Matt. P. Wood	Matt. P. Wood	Terre Haute, Ind.
Cin., Cumberland Gap & Charleston	W. J. Taylor		Knoxville, Tenn.
Cincinnati, Hamilton & Dayton	Q. Williams	P. Hickey	Cincinnati, Ohio.
Cincinnati, Richmond & Chicago	Lewis Williams		Cincinnati, Ohio.
Cincinnati & Indianapolis Junction	M. M. Martin		Indianapolis, Ind
Cincinnati & Muskingum Valley	C. C. Waite	C. C. Waite	Zanesville, Ohio.
Cincinnati, Lafayette & Chicago	E. H. Waldron	J. W. Haight	Lafayette, Ind.
Cincinnati, Sandusky & Cleveland		J. C. Buxton	Sandusky, Ohio.
Columbus & Hocking Valley	J. W. Doherty	J. W. Doherty	Columbus, Ohio.
Concord & Claremont	George E. Todd		Concord, N. H.
Concord	H. E. Chamberlin.	H. E. Chamberlin.	Concord, N. H.
Connecticut River	John Mulligan.	John Mulligan.	Springfield, Mass.
Connecticut & Passumpsic Rivers			Lyndonville, Vt.
Connecticut Western	W. H. Yeomans		Hartford, Ct.
Cooperstown & Sus. Valley			
Cumberland Valley	O. N. Lull	O. N. Lull	Chambersburg, Pa.
Cumberland & Pennsylvania	C. Slack		Mt. Savage, Md.
D			
Danbury & Norwalk	John W. Bacon		Danbury, Ct.
Dakota Southern	J. S. Meckling	J. S. Meckling	Sioux City, Iowa.
Danville, Hazelton & W			
Davenport & St. Paul	N. H. Wood		Urbana, Ill.
Dayton & Michigan	J. H. Weller		Dayton, Ohio.
Dayton & Union	C. C. Gale		Indianapolis, Ind.
Delaware	H. F. Kenney		Philadelphia, Pa.
Delaware & Hudson	R. Manville		Carbondale, Pa.
Delaware, Lackawanna & Western	W. F. Halstead.	G. W. B. Cushing.	Scranton, Pa.
Oswego and Syracuse Division	W. B. Phelps		Oswego, N. Y.
Utica, Chenango & Sus. "	George F. Thompson		Utica, N. Y.
Denver City & Boulder Valley		G. W. B. Cushing.	New-York, N. Y.
Denver Pacific	Edmund S. Bowen		Kansas City, Mo.
Denver & Rio Grande	W. W. Borst		Denver, Col.
Des Moines Valley	John Givin	G. E. Kilbourne.	Keokuk, Iowa.
Detroit & Bay City	A. H. Reese		Detroit, Mich.
Detroit and Milwaukee	Andrew Watson.	John S. Lorimer.	" "
Detroit, Hillsdale & Indiana	H. C. Goodell	W. F. Parker	" "
Detroit, Eel River & Illinois	J. J. Grafton		Denver, Ind.
Detroit, Lansing & Lake Michigan	A. H. Reese		Detroit, Mich.
Dorchester & Delaware	D. Stewart Hessey		Cambridge, Md.
Dunkirk, Alleghany Valley & Pittsburg	D. Thayer	C. V. DeForest	New-York City.
Dubuque & South-Western	J. P. Farley		Dubuque, Iowa.
E			
East Alabama & Cincinnati	John M. Robinson		Baltimore, Md.
East Tennessee, Virginia & Georgia	Joseph Jaques		Knoxville, Tenn.
Eastern	*C. F. Hatch	C. W. Pratt	Boston, Mass.
Eastern Shore	William Thompson		Princess Anne, Md.
Eastern Kentucky	J. McL. Straughton	George Gibbs	Riverton, Ky.
Elizabethtown & Paducah	D. Brock	D. Brock	Elizabethtown, Ky.
Erie	H. D V. Pratt	L. L. Lockwood	New-York, N.Y.
Eastern & Delaware Division	G. S. Redington		Port Jervis, N. Y.
Susquehanna & Rochester "	C. W. Gedner		Elmira, N. Y.
Western & Buffalo "	R. G. Taylor		Buffalo. N. Y.
European & North-American	M. H. Angel	M. H. Angell	Bangor, Maine.
Erie & Pittsburg	John M. Kimball.	Wm. Mullins	Erie, Pa.
St. John & St. Croix Division	B. R. Burfee		St. John, N. B.
Evansville & Crawfordsville	L. Pearson		Evansville, Ind.
Evansville, Terre Haute & Chicago	Jos. Collett, jr.		Terre Haute, Ind.
F			
Fairbury, Pontiac & North-Western	A. E. Tyler		
Fairhaven Branch	Warren Ladd		New-Bedford, Mass.
Fitchburg	Chas. L. Haywood.	John Adams	Boston, Mass.
Flint & Pere Marquette	G. C. Kimball	G. C. Kimball	East-Saginaw, Mich.
Flushing & North-Side	R. D. Turner		Hunter's Point, L.I.
Fonda, Johnstown & Gloversville	Lawton Caten		Gloversville, N. Y.
Fort Wayne, Jackson & Saginaw	W. A. Ernst	Wm. F. Parker	Jackson, Mich.
Fort Wayne, Muncie & Cin	W. W. Worthington	W. W. Worthington	Fort Wayne, Ind.
Freehold & Jamesburg Agricultural	J. S. Buckalew.	J. S. Buckalew	Trenton, N. J.
G			
Galveston, Harrisburg & San Antonio	Geo. B. Nichols.	J. W. Pierce	Galveston, Texas.
Galveston, Houston & Henderson	George B. Nichols.		Galveston, Texas.
Georgia	Col. E. W. Cole		Nashville, Tenn.
Gettysburg			
Gilman, Clinton & Springfield	S. H. Melvin		Springfield, Ill.
Grand Rapids & Indiana	*C. E. Gorham		Fort Wayne, Ind.
S. Division	J. M. Matheany		Fort Wayne, Ind.
N. Division	H. D. Wallen, jr		Grand Rapids, Mich.
Grand Rapids & Indiana		William Mullins.	Pittsburg, Pa.
Grand Trunk	C. J. Brydges	John Taylor	Montreal, Canada.
East Division	Henry Bailey		
West Division	W. J. Spicer		
Grand Tower and Carbondale	H. V. Olyphant.	Wm. W. Harris	Grand Tower, Ill.
Great Western	William K. Muir.	Robert Beatty	Hamilton, Canada.
Green Bay & Lake Pepin	D. M. Kelly		Green Bay, Wis.
Greenville & Columbia	Thomas Dodamead		Columbia, S. C.
H			
Hannibal & St. Joseph	O. S. Lyford		Hannibal, Mo.
Harlem Extension	F. C. White		Rutland, Vt.
Hartford, Providence & Fishkill	Samuel Nott		Hartford, Ct.
Haverhill & Georgetown			
Housatonic	H. W. Franklin		Bridgeport, Ct.
Houston & Texas Central	J. Durand	W. M. Rice, N.Y.	Houston, Texas.
Southern Division	W. H. Vaughan		Houston, Texas.
Northern Division	M. R. Baldwin		Corsicana, Texas
Houston Tap & Brazoria	S. Schoch		Houston, Texas.
Huntingdon & Broad Top	J. McKillips	B. A. Knight	Huntingdon, Pa.
I			
Illinois Central	A. Mitchell	O. Ott	Chicago, Ill.
Chicago Division	C. A. Beck		Centralia, Ill.
Northern Division	J. C. Jacobs		Amboy, Ill.
Iowa Division	D. W. Parker		Dubuque, Iowa.
Illinois & St. Louis	W. K. McComas		St. Louis, Mo.
Indiana North & South	M. W. Cook		Attica, Indiana.
Indianapolis, Bloomington & Western	J. E. Gimperling		Urbana, Ill.
Indianapolis, Cincinnati & Lafayette	George L. Barringer.		Cincinnati, Ohio.
Indianapolis & Vincennes	E. W. McKenna		Indianapolis, Ind.
Indianapolis & Vincennes		Wm. Mullins.	Pittsburg, Pa.
Indianapolis & St. Louis	S. Woodward	J. W. Morse.	St. Louis, Mo.
Indianapolis, Peru & Chicago	A. B. Southard	D. Macy.	Indianapolis, Ind.
Michigan City Division	E. C. Murphy		La Porte, Ind.
Intercolonial Railway	Lewis Carvell		St. John, N. B.
International & Houston & Gt. Northern	H. M. Hoxie		Houston, Texas.
Iowa Midland	J. B. Watkins		Clinton, Iowa.
Iron			
Ithica & Athens			Ithica, N. Y.
J			
Jacksonville, North-Western & S. E.	E. S. Greenleaf		Jacksonville, Ill.
Jacksonville, Pensacola & Mobile	James M. Baker		Jacksonville, Fla.
Jefferson, Madison & Indianapolis	Horace Scott		Louisville, Ky.
Jefferson, Madison & Indianapolis		W. Mullins.	Pittsburg, Pa.
Jefferson, Madison & Indianapolis	Wm. Mullins	R. J. Elvin	Jeffersonville, Ind.
Junction & Breakwater	John A. Sheaff		Lewis, Del.
K			
Kansas Central	A. E. Buchanan		Leavenworth, Kan.
Kansas City, St. Joseph & Council Bluffs	J. F. Barnard		Detroit, Mich.
Kent County & Queen Anns & Kent	C. H. Platt		Chestertown, Md.
Kent County & Queen Anns & Kent	Jennings Hood		Massey's Junc., Md.
Kansas Pacific	Edward S. Bowen		Kansas City, Mo.
Kansas Pacific		J. L. Woods	St. Louis, Mo.
Kaw Valley Division	George Noble		Lawrence, Kansas.
Smoky Hill Division	O. H. Dorrance		Ellis, Kansas.
Denver Division	C. W. Fisher		Denver, Col.
Kentucky Central	G. H. Pendleton.	Geo. P. Bowler	Covington, Ky.
King's Mountain	E. Thomas	F. M. Galbraith	Yorkville, S. C.
Knox & Lincoln	C. A. Combs	Oliver Morse	Bath, Maine.
Knoxville & Charleston	R. C. Morris		Knoxville, Tenn.
Knoxville & Ohio	M. J. Parrott		Knoxville, Tenn.
Kansas City, Memphis & Mobile		R. C. McBeth	
L			
Lackawanna & Bloomsburg	D. T. Bound	G. W. B. Cushing.	Kingston, Pa.
Lake Erie & Louisville	J. H. Burgoon		Fremont, Ohio.
Lake Ontario Shore	E. A. Van Horne		Oswego, N. Y.
Lake Shore & Michigan Southern	Charles Paine	A. C. Armstrong.	Cleveland, Ohio.
Kalamazoo Division	William Wheaton		Kalamazoo, Mich
Detroit Division			
Lansing Division			
Laurel Fork & Sand Hill	D. C. Mudge		Volcano, W. Va.
Leavenworth, Lawrence & Galveston	Chas. B. Peck	E. O. Foote, jr.	Lawrence, Kan.
Lawrence & South-Western	R. B. Gemmell	R. B. Gemmell	Lawrence, Kan.
Lehigh Valley	Robert H. Sayre.	L. Chamberlin (Philadelphia).	Bethlehem, Pa.
Beaver Meadow Division	A. G. Brodhead, jr		Bethlehem, Pa.
Mahony Division	James I. Blakslee		Mauch Chunk, Pa.
Wyoming Division	A. Mitchell		Mauch Chunk, Pa.
Lewisburg Centre & Spruce Creek	Frank Thompson		Wilkesbarre, Pa.
Lexington & Big Sandy	W. F. Gaylord		Lewisburg, Pa.
			Ashland, Ky.

Little Rock & Fort Smith	Asa Hodges		Little Rock, Ark.
Logansport, Crawfordsville & S. W.	E. C. Dawes		Cincinnati, Ohio.
Long Island	Jno. B. Morford	Oliver Charlick	Hunter's Point, L. I.
Louisville & Nashville & G. Southern	Albert Fink	G. C. Breed	Louisville, Ky.
Clarksville Division	Rcbert Meek		Clarksville, Tenn.
Memphis Division	J. T. Flynn.		Memphis, Tenn.
Nashville & Decatur Division	D. F. Whitcomb		Nashville, Tenn.
Louisville, Cin. & Lexington	George Skinner	Geo. Skinner	Louisville, Ky.
Lexington Division			
Mt. Sterling Division			
Shelbyville Division			
Louisville, New-Albany & Chicago	M. Sloat	J. R. Parker	New-Albany, Ind.

M

McMinnville & Manchester	W. S. Huggins		McMinnville, Tenn.
Macon & Augusta			
Macon & Brunswick	William McRae	Solomon Hass	Macon, Ga.
Macon & Western	G I. Foreacre		Savannah, Ga.
Madison & Portage	H. C. Atkins		Madison, Wis.
Maine Central	L. L Lincoln	G. A. Phillips	Augusta, Me.
Androscoggin Division	A. Brown.		Lewiston, Me.
Manchester & Lawrence	H. E. Chamberlin		Concord, N. H.
Marietta & Cincinnati			
Marietta & Pittsburg	A. J. Warner	R. B. Hoover	Marietta, Ohio.
Marquette, Houghton & Ontonagon	D. H. Merritt	C. E. Van Cleve	Marquette, Mich.
Maryland & Delaware	J. L. Caldwell	J. L. Caldwell	Easton, Md.
Memphis, Carthage & North-Western	George A. Burt		Carthage, Mo.
Memphis & Little Rock	A. S. Livermore.		Memphis, Tenn.
Memphis & Charleston	W. J. Ross		Memphis, Tenn.
Michigan Air-Line			
Michigan Central	H. E. Sargent		Chicago, Ill.
Michigan Central		John Newell	Detroit, Mich.
Grand River Valley Division	Charles B. Bush		Jackson, Mich.
Jackson, Lansing & Saginaw Div.	Geo. C. Hopper		Jackson, Mich.
South-Haven Division	Geo. E. Curtiss		Kalamazoo, Mich.
Joliet Division			
South-Bend Division			
Michigan Lake Shore	Chas. E. Gorham		Fort Wayne, Ind.
Michigan Lake Shore	P. S. O'Rourke		Monteith, Mich.
Midland Railway of Canada	H. G. Taylor.		Port Hope, Ont.
Middleburg & Schoharie & S. Valley	P. S. Danforth		Middleburg, N. Y.
Middleboro & Taunton	A. E. Swasey		Taunton, Mass.
Midland Pacific	J. N. Converse		Lincoln, Neb.
Milwaukee & Northern	J. W. Crippin		Milwaukee, Wis.
Milwaukee, Lake Shore & Western	W. Elwell		Sheboygan, Wis.
Western Division	J. S. Buck		Appleton, Wis.
Mineral Point	G. W. Cobb.		Mineral Point, Wis.
Mississippi Central	R. N. Colquhoun.		Water Valley, Miss.
Mississippi Central		A. S. Roberts	New-Orleans, La.
Mississippi & Tennessee	M. Burke	M. Burk	Memphis, Tenn.
Mississippi Valley & Western	E. P. Buell		Quincy, Ill.
Missouri, Iowa & Nebraska	Col. Henry Hill		Warsaw, Ill.
Missouri, Kansas & Texas	W. R. Woodward	G. M. Babcock	Sedalia, Mo.
Cherokee Division	W. H. Adams		Chetopa, Kansas.
Choctaw Division	S. G. Eddy		Holden, Mo.
Sedalia Division	J. J. Frey.		Sedalia, Mo.
Neosho Division	L. S. Hamilton		Neosho Falls, Kan.
Missouri Pacific	A. A. Talmage	W. H. Patriarche	St. Louis, Mo.
Eastern Division	J. T. Avery		
Western Division	A. R. Mapes		
Missouri River, Fort Scott & Gulf	B. S. Henning	Allen Bowen	Kansas City, Mo.
Mobile & Alabama, G. T.			
Mobile & Ohio	L. J. Fleming	C. E. Rushing	Mobile, Ala.
	Cecil Fleming		Mobile, Ala.
	E. S. Hosford		Macon, Miss.
	M. M. Miller		Jackson, Tenn.
Mobile & Girard	W. L. Clark		Columbus, Ga.
Mobile & Montgomery	G. Jordon	G. Jordon	Montgomery, Ala.
Monadnock			Peterboro, N. H.
Montgomery & West-Point	G. P. Ball		
Montgomery & Eufaula	B. Dunham	B. Dunham	Montgomery, Ala.
Monticello	W. F. Slater		Urbana, Ill.
Morgans, Louisiana & Texas		Charles A. Whitney & Co.	New-Orleans, La.
Morris & Essex	Andrew Reasoner		Hoboken, N. J.
Muncy Creek	H. R. Merhling		Hughesville, Pa.

N

Nashville, Chattanooga & St. Louis	J. W. Thomas		Nashville, Tenn.
Naugatuck	G. W. Beach		Bridgeport, Ct.
New-Brunswick & Canada	J. P. Crangle	Thamas Williams	St. Stephen, N. B.
New-Bedford & Taunton	Warren Ladd		New-Bedford, Mass.
New-Canaan	Samuel St. John		New-Canaan, Ct.
New-Haven & Derby			
New-Haven & Northampton	C. N. Yeamans	C. N. Yeamans	New-Haven, Ct.
New-Haven, Middletown & Willimantic	W. A. Waterbury	W. A. Waterbury	Middletown, Ct.
New-Jersey Southern	W. S. Sneden		Long Branch, N. J.
New-Jersey West Line	J. B. Bassinger		Newark, N. J.
New-Orleans & Selma	T. H. DuPuy		Selma, Ala.
New-Orleans, Jackson & Great Northern	L. H. Sellars	A. S. Roberts	New-Orleans, La.
New-Orleans, Mobile & Texas	S. N. Scranton		New-Orleans, La.
New-York & Harlem	Chas. M. Bissell	R. C. Moore	New-York, N. Y.
New-York & New-Haven	E. M. Reed	R. N. Dowd	Hartford, Ct.
N. Y. & N. H. Division	John T. Moody		New-York, N. Y.
Hartford Division	C. S. Davidson		Hartford, Ct.
New-York & Mahopac			
New-York, Boston & Montreal	C. L. Kimball		Dutchess Jn., N. Y.
New-York Central & Hudson River	J. Tillinghast	C. V. DeForest	Albany, N. Y.
Eastern Division	Zenas C. Priest		Utica, N. Y.
Syracuse & Rochester Division	W. G. Lapham		Syracuse, N. Y.
Buffalo & Rochester Division	M. W. Torrence		Buffalo. N. Y.
New-York & Oswego Midland.	C. W. Douglas	P. Bundy	Jersey City, N. J.
Northern Division	W. P. McKinley		Oswego, N. Y.
New-York, Kingston & Syracuse	H. P. Breed		Rondout, N. Y.
Northern Pacific	*C. W. Mead		Brainerd, Minn.
Minnesota Division			
Lake Superior & Miss. Division	W. W. Hungerford		St. Paul, Minn.
North-Louisiana & Texas	J. W. Green.		Monroe, La.
North-Pennsylvania	S. W. Roberts	F. A. Cornby	Philadelphia, Pa.
Northern Canada	†F. W. Cumberland		Toronto, Can.
Northern Central	Alfred R. Fiske		Harrisburg, Pa.
Northern (New-Hampshire)	George E. Todd		Concord, N. H.
North-Eastern (South-Carolina)	S. S. Solomon		Charleston, S. C.
North-Wisconsin	A. H. Baldwin		Hudson, Wis.

O

Ohio & Mississippi	E. L. Ryder		Cincinnati, Ohio.
Oil Creek & Alleghany River	J. J. Lawrence		Pittsburg, Pa.
Old Colony	J. R. Kendrick		Boston, Mass.
Omaha & North-Western	R. R. Cable		Rock Island, Ill.
Orange, Alexandria & Manassas			Alexandria, Va.
Oregon & California	H. Thielson	G. W. Weidler	Portland, Oregon.
Owensboro & Russellville	Edmund Turner		Owensboro, Ky.

P

Paducah & Memphis	J. W. Wilber		Paducah, Ky.
Painesville & Youngstown	J. C. Sharpless		Painesville, Ohio.
Paris & Danville	B. F. Matthius		Danville, Ill.
Paris & Decatur	F. C. Stratton	P. Campbell	Paris, Ill.
Peninsula	C. F. Miller		Battle Creek, Mich.
Pennsylvania	* A. J. Cassatt	Enoch Lewis	Philadelphia, Pa.
New-York Division	F. W. Jackson		Jersey City, N. J.
Amboy Division	Isaac S. Buckalew		Trenton, N. J.
Belvidere Division	J. A. Anderson		Lambertville, N.J.
Bald Eagle Valley Division			
Tyrone & Clearfield Division			
Western Pennsylvania Division	Robert Neilson		Blairsville, Pa.
Lewiston Division	Persifer F. Smith		Lewiston, Pa.
Bedford Division	Wm. H. Brower		Bedford, Pa.
Pensacola & Louisville	Daniel H. Cram.		Pensacola, Fla.
Peoria & Rock Island	John R. Hilliard		Peoria, Ill.
Peoria, Pekin & Jacksonville	James F. Kelsey		Pekin, Ill.
Petersburg	* Jas. C. Sprigg	D. R. Dunn	Petersburg, Va.
Philadelphia & Reading	J. E. Wootten	W. S. Wilson	Reading, Pa.
East-Penn. & Leb. Valley Branch			
Catawissa & Williamsport "	George Webb		Williamsport, Pa.
Germantown & Norristown "	T. H. Wilson		
Reading & Columbia	B. Van Lew		Columbia, Pa.
Lebanon & Tremont	H. W. Tracy		Pine Grove, Pa.
Philadelphia and Baltimore Central	Henry Wood	Henry Wood	Philadelphia, Pa.
Philadelphia & Erie	W. A. Baldwin.	E. Lewis	Erie, Pa.
Western Division	J. W. Reynolds		Erie, Pa.
Middle Division	Edmund L. Tyler		Renovo, Pa.
Eastern Division	Thomas Gucker		Williamsport, Pa.
Philadelphia, Wilmington & Baltimore	H. F. Kenney		Philadelphia, Pa.
Pithole Valley	J. T. Blair		Pithole City, Pa.
Pittsburg, Cincinnati & St. Louis	*J. N. McCullough.	Wm. Mullins	Pittsburg, Pa.
Pittsburg & Cin. Division	Hugh Pitcairn		Pittsburg, Pa.
Little Miami Division	J. D. Ellison.		Cincinnati, Ohio.
Indianapolis & C. Division	D. W. Caldwell		Columbus, Ohio.
Pittsburg, Washington & Baltimore	E. K. Hindman		Pittsburg, Pa.
Pittsburg, Ft Wayne & Chicago	*J. N. McCullough.	Wm. Mullins	Pittsburg, Pa.
Eastern Division	Richard Wiggin		Pittsburg, Pa.
Western Division	C. D. Gorham		Fort Wayne, Ind.
Port Royal	S. C. Millett		Port Royal, S. C.
Port Huron & Lake Michigan	W. L. Bancroft		Port Huron, Mich.
Portland & Ogdensburg	J. Hamilton	John E. Donnell	Portland, Maine.
Portland & Oxford Central	F. B. Smith		Canton, Maine.
Portland & Rochester	W. H. Turner.	W. H. Turner	Portland, Maine.
Portland, Saco & Portsmouth	Francis Chase		Portland, Maine.
Portsmouth, Great Falls & Conway	A. A. Perkins		Portsmouth, N. H.
Portsmouth	H. E. Chamberlin		Concord, N. H.
Port Whitby & Port Perry	B. R. Kimball		Whitby, Can.
Poughkeepsie & Eastern	P. P. Dickinson	A. W. Cable	Poughkeepsie, N.Y.
Providence & Worcester	W. D. Hilton	W. D. Hilton	Providence, R. I.
Providence, Warren & Bristol	Waterman Stone		Providence, R. I.

Q

Quincy, Alton & Illinois	N. D. Munson		Quincy, Ill.
Quincy, Missouri & Pacific	John N. Schermerhorn		Quincy, Ill.
Queen Anns & Kent	Jennings Hood		Centreville, Md.

R

Raleigh & Gaston	A. B. Andrews	A. B. Andrews	Raleigh, N. C.
Rensselaer & Saratoga	Henry B. Smith		Troy, N. Y.
Richmond & York River	W. N. Bragg	Hugh Graham	Richmond, Va.
Richmond & Danville	T. M. R. Talcott		Richmond, Va.
Richmond, Fred. & Potomac	E. T. D. Myers	T. L. Courtney	Richmond, Va.
Richmond & Petersburg	R. L. Stainback		Richmond, Va.
Ripley			
Rockford, Rock Island & St. Louis	R. R. Cable		Rock Island, Ill.
Rockville	A. H. Putnam		Rockville, Ct.
Rome, Georgia			Rome, Ga.
Rome, Watertown & Ogdensburg	J. W. Moak		Watertown, N. Y.

S

St. Lawrence & Ottawa	R. Luttrell		Prescott, Can.
St. Joseph & Denver City	L. D. Tuthill		St. Joseph, Mo.
St. Paul & Pacific	E. Q. Sewell	E. C. Becker	St. Paul, Minn.
St. Paul & Sioux City	J. F. Lincoln		St. Paul, Minn.
St. Paul, Stillwater & Taylor's Falls			
St. Louis, Alton & Terre Haute	W. G. Broughton		St. Louis, Mo.
St. Louis & Iron Mountain	Arthur W. Soaper.	W. S. Cuddy	St. Louis, Mo.
St. Louis & South-Eastern	*E. F. Winslow	C. W. Gardiner	St. Louis, Mo.
St. Louis Division	George S. Winslow		Mt. Vernon, Ill.
Nashville Division	H. L. Morrill		Henderson, Ky.
St. Louis, Kansas City & Northern	W. C. Van Horne	R. W. Green	St. Louis, Mo.
St Louis Division	J. L. Hinkley		St. Louis, Mo.
St. Louis, Vandalia, Terre Haute & Ind.	John E. Simpson.		Indianapolis, Ind.
St. Louis, Vandalia, Terre Haute & Ind.	Chas. R. Peddle		Terre Haute, Ind.
Sacramento Valley & P. & S. V.	F. A. Bishop		Sacramento, Cal.
Saginaw Valley & St. Louis	J. B. Gillett	J. B. Gillett	Saginaw, Mich.
San Francisco & Northern Pacific			
Savannah & Charleston	C. S. Gadsden		Charleston, S. C.
Savannah, Griffin & North-Alabama			
Savannah & Memphis			Henderson, Ky.
Seaboard & Roanoke	J. M. Robinson	J. A. Walton	Baltimore, Md.
Selma, Marion & Memphis			
Selma & Gulf			
Selma, Rome & Dalton	E. G. Barney		Patona, Ala.
Sheboygan & Fond du Lac	Brandon Mozley	Brandon Mozley	Fond du Lac, Wis.
Shenango & Allegheny	G. H. McKibbin		Greenville, Pa.
Shepang Valley			
Sioux City & Pacific	L. Burnett	L. Burnett	Missouri Valley, Ia.
Sodus Point & Southern	F. A. Bassler		Sodus Point, N. Y.
South-Shore	J. R. Kendrick.		Boston, Mass.
South & North-Alabama	D. F. Whitcomb		Nashville, Tenn.
South-Eastern Counties Junction			
South-Side, Long Island			
South-Carolina		A. Mitchell	Charleston, S. C.
Southern Central	James G. Knapp		Auburn, N. Y.
Southern Minnesota	*H. W. Holley		Wells, Minn.
Southern Pacific of California	A. N. Towne		Sacramento, Cal.
South-Mountain Iron Co.	S. W. Weaver		Mt. Creek, Cumb. Co., Pa.
Spartanburg & Union	Thomas P. Jeter		Unionville, S. C.
Springfield & North-Western	*A. J. Ware		Pekin, Ill.
Springfield & Ill. South-Eastern.	G. W. Norris		Springfield, Ill.
Staten Island	J. W. Wilbur		New-York, N. Y.
Sterling Mountain			
Stockton & Copperopolis			
Stonington & Providence	A. S. Mathews	A. S. Mathews	Stonington, Ct.
Sullivan & Erie	R. A. Packer		Towanda, Pa.
Sycamore & Cortland			Sycamore, Ill.
Syracuse Northern	C. B. Morse	C. B. Morse	Syracuse, N. Y.
Syracuse, Binghamton & New-York	T. Voorhees	G. W. B. Cushing	Syracuse, N. Y.

T

Tennessee & Pacific	George Maney		Nashville, Tenn.
Texas & New-Orleans	R. B. Baer		Houston, Texas.
Toledo, Peoria & Warsaw	W. H. Cruger	J. A. Winner	Peoria, Ill.
Western Division	David K. Smith		Peoria, Ill.
Western Division	William E. Dorwin		Warsaw, Ill.
Toledo, Wabash & Western	Geo. H. Burrows	J. J. Nessle	Toledo, Ohio.
Eastern Division	C. W. Bradley		Lafayette, Ind.
Western Division	D. A. Collins		Lafayette, Ind.
Ohio Division	H. F. Clark		Toledo, Ohio.
Troy & Boston	C. W. Moseley		Troy, N. Y.
Toronto, Grey & Bruce	N. Weatherston	W. Watson	Toronto, Can.
Toronto & Nipissing	J. C. Bailey		Toronto.
Tuckerton	J. Naramore		Tuckerton, N. J.

☞ The remaining portion of this list is unavoidably crowded out of this number.

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JAMES R. THOMPSON & CO.,

MANUFACTURERS OF

HAMMERED AND ROLLED

CAST STEEL,

OF ALL DESCRIPTIONS,

Warren Street, Jersey City, N. J.

Tool, Drill, Frog Plates and Points, Cutlery, Rake, Axe, Hoe, Machinery, Spring, Wagon-Axle, Tire, Sword, Bayonet, Rifle, and Pistol, MADE TO ORDER.

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Late of Pompton and Ætna Steel Works.

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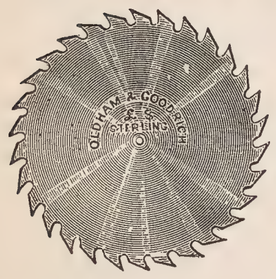

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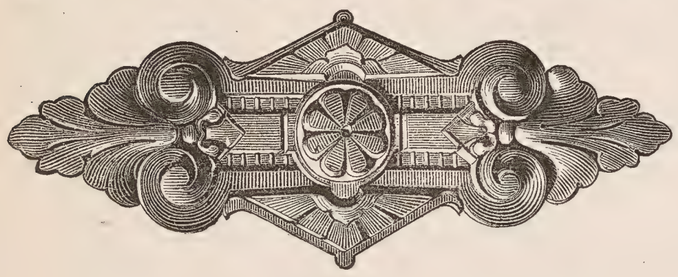

We invite the attention of the trade, including

Furniture Manufacturers, Builders, Interior Decorators, Stair-Builders, CAR BUILDERS, Architects, Steamboat Builders, Organ Manufacturers, and others,

To our variety of styles of ornaments, made to match black walnut in color, and which are perfectly fitted for use where not exposed to the weather. They have been sold extensively for several years, and have given entire satisfaction—so that all who have once used them have become constant consumers. They are artistic in design and unequaled in execution, being the production of the best artists, carvers, die sinkers, and moulders.

These ornaments hold glue and screws as well as carvings. They do not warp or crack. They are unaffected by changes of temperature, and withstand dampness as well as furniture. They will polish in every respect equal to wood, either with shellac, oil, wax, or varnish, and with less trouble, as there is no open grain to fill. They will gild or bronze beautifully by simply sizing, without any other preparation.

Our goods can be purchased of the Hardware houses in the various cities of the Union. Circulars mailed on application to

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THE PRATT & WHITNEY CO.,

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AND

SILVER PLATING.

Bronzing and Coppering,

IN ALL STYLES, BY

A. W. LADD,

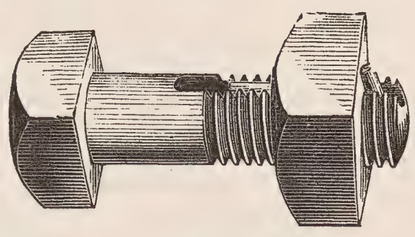
5 Dey St., Room 7, New-York.

WM. COURTENAY, President. CHAS. F. COBB, Secretary.

The Lock-Nut and Bolt Co., of New-York,

Office No. 61 BROADWAY, New-York.

Manufacturers of all kinds of BOLTS, for FISH-PLATES, CARS, BRIDGES, MACHINERY, ARRIAGES, &c., with the

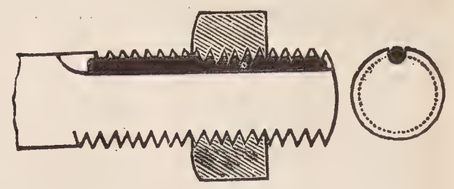


"CUMMING NUT-LOCK,"

Patented

June 16, 1868,

August 23, 1870.



SECTIONS.

Unequaled for CHEAPNESS, SIMPLICITY & EFFECTIVENESS.

This simple device, as will be seen by the engravings, consists of a groove being cut in the threaded part of a screw bolt into which is placed a key of copper wire, or other soft metal; when the nut is screwed on, it cuts a thread on the key, thereby making it impossible for the key to get out until the nut is taken off. When the nut is screwed up to its place, that part of the key over which the nut has passed is riveted up against the nut with a small punch, destroying the thread on the key. The nut, therefore, can not move backward until force is used, as with a wrench.

The groove can be rapidly cut with a simple machine designed for the purpose.

Experience has proved this device absolutely reliable, and it is the cheapest of all known devices for the purpose. By its use, old bolts on which the nuts have become too slack for use can be made as good as new, making it a great saving to railroad companies and others in that item alone. It is cheaper than a check-nut.

If the bolt should become slack from shrinking of timber or other causes, *the nut will always remain firmly attached to the bolt*, and, with the wrench, can be screwed up *any distance*, and the wire riveted up any number of times, or can be taken off without injury to the nut or bolt.

This is the only method in use that locks the nut firmly to the bolt without regard to place or surroundings, all others require some attachment that holds the bolt in its position, and a washer or other attachment to keep the nut from turning.

DIRECTIONS FOR USE.—Place the copper key in the slot, pointed end out, and beveled side up, in such a position that when the nut is screwed to its place about three-eighths of an inch of the key will project beyond its outer face. Then screw the nut to its place *over the key*, allowing it to cut its own thread in the copper. Then take a narrow flat set punch, and rivet the projecting part of the key *solidly* against the outer face of the nut. To tighten the nut: screw it up, and rivet the key tighter. To remove the nut: simply apply the wrench and unscrew the nut. It will cut its own way out through the copper. The same key can be used several times, by moving it outward a few threads in the slot.

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J. R. DENMAN,

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BENT OR CURVED GLASS,

ORNAMENTAL CUT GLASS, ETC.,

FOR RAILROAD CARS,

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And corner of Canton Ave. and Albemarle St.,

Keep on hand and fill orders promptly for

Southern Yellow Pine Car Sills and Flooring.

They will also attend to the reshipping and forwarding of cargoes of Lumber consigned to Baltimore.

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SOLE MAKER OF THE

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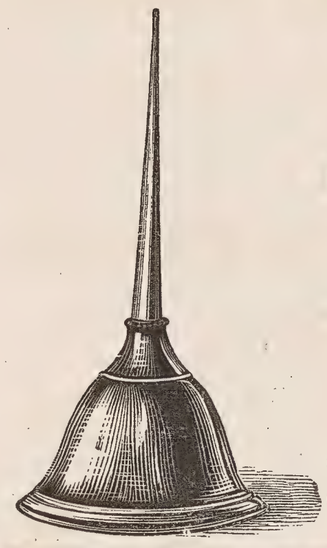

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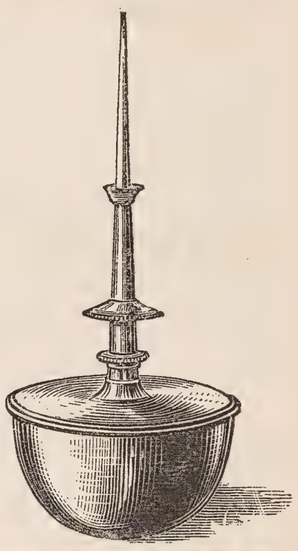
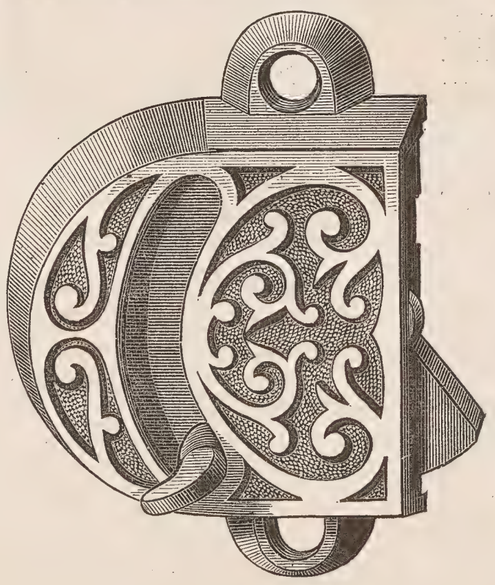
Orders respectfully solicited for all descriptions of Stamped, Cast and Spun Metal Work, Dies and Tools, Nickel Plating, Gilding, etc.





ECCLESTON & COVILLE,

Automatic Reverse-Locking

SASH-LOCK.

Patented June 4, 1872.

ECCLESTON & PLATT, Proprietors, Oxford, Chenango Co., N. Y.,

Would call the attention of **Railroad Men** generally, and **Car Builders** in particular, to a new and decided improvement in **Sash-Locks,** which possess all the requisites for **Easy Working** and **Effective Action.** Are very simple in construction and easily applied. The **Traveling Spring** throws the bolt either way from the centre, and makes it effective by direct action to hold the sash up, or locked when closed. You do not have to hold the bolt while raising or lowering the sash, thus giving the use of both hands for that purpose. Works easily and surely, and is adapted to all windows. Address all orders to

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Samples at Vose, Dinsmore & Co.

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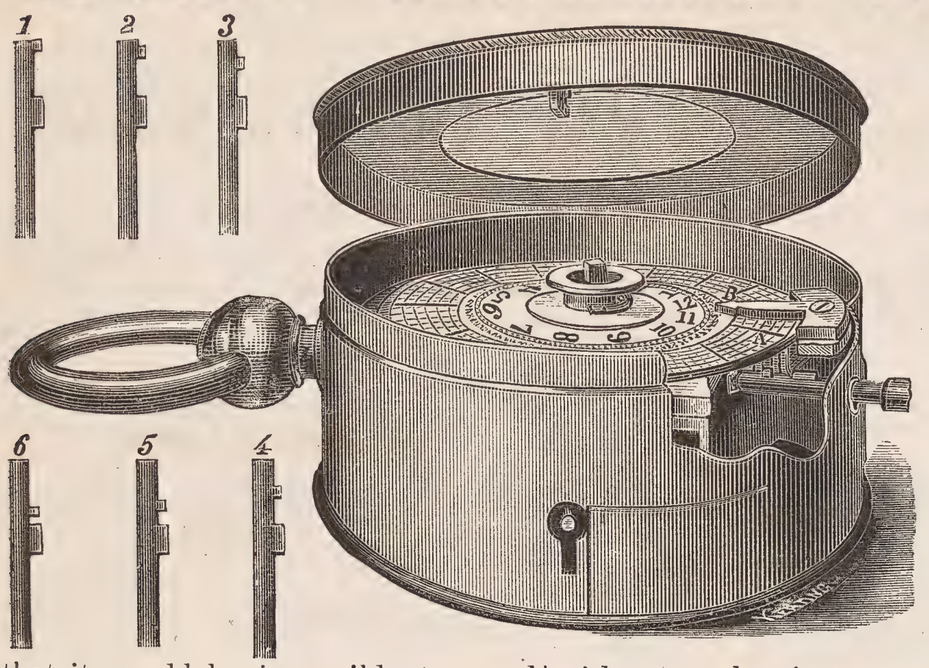

Important for all large Corporations and Manufacturing concerns; capable of controlling, with the utmost accuracy, the motion of a watchman or patrolman, as the same reaches different stations of his beat.

The instrument is complete in itself, portable, and as reliable as the best lever watch.

It is not so likely to become disarranged in its works as a good watch, because its parts are stronger. But when it needs cleaning, any common watchmaker can adjust it, its mechanism being simple.

It requires no fixtures or wires communicating from room to room, as is the case with the ordinary Watch-Clocks. A small, inexpensive, stationary key is alone required at each station.

Its use is not restricted to a single building, and places can be guarded that it would be impossible to guard with any other instrument, such as Railroad Tunnels, Bridges, Shops, etc.

The instrument will, in all cases, be warranted perfect and satisfactory.

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FOR COOLING HOT JOURNALS.

It will immediately cool a *hot journal* while the cars are in motion, and no journal will heat where the box is packed with it.

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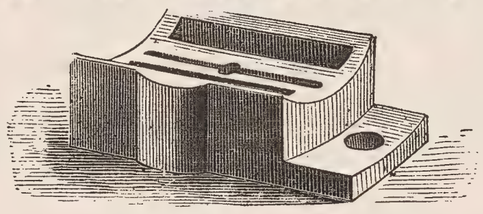

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And manufacturers of other Railway Journal Bearings, and general Brass Founders and Finishers,

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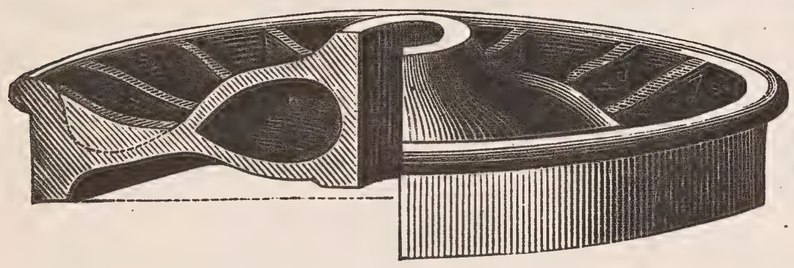

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CAR WHEELS AND RAILWAY CASTINGS.

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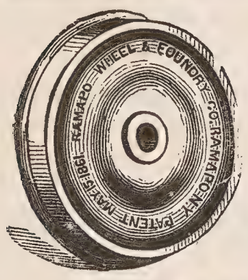

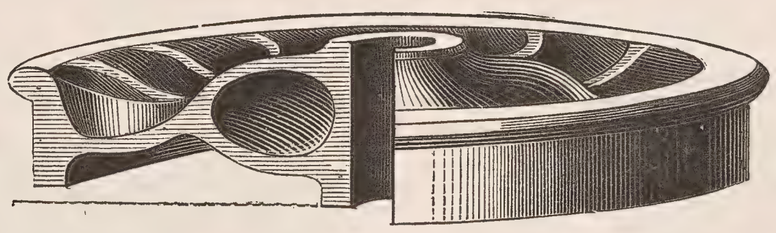

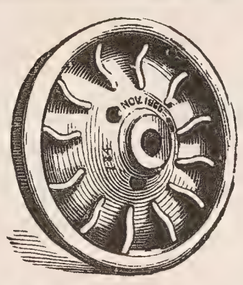

RAMAPO WHEEL AND FOUNDRY COMPANY,

MANUFACTURERS OF

Wheels for Drawing-room and Sleeping Coaches,

LOCOMOTIVES, TENDERS, PASSENGER AND FREIGHT CARS.

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Varnish and Paint Manufacturers,

136, 138 and 140 North Fourth Street,

PHILADELPHIA,

Sole Manufacturers of

J. W. TULLY'S

Improved Paint Filling.

Patented February 8th, 1870.

A COMPOSITION OR FILLING FOR

Cars, Engines, Locomotives, Tenders, Coaches, Carriages, Steamboats, Safes, Piano Plates, Tools, Machinery, etc., etc.

This article possesses, unquestionably, superior advantages over all other Fillers now in use, from the following considerations—namely: Its elasticity is such that it will not peel, crack, nor blister. It possesses great durability, and is unequaled for hardness of surface and smoothness of texture, consequently it presents a beautiful groundwork for the reception of colors. It is a quick, firm dryer—two coats can readily be applied in a day—where great dispatch is necessary three coats may be put on in the same time. It is an *easy* rubber, saving fully one half the time usually employed in that heretofore unpleasant work—the part of painting which has been the most tedious of all, but now rendered easy, rapid and pleasant by the use of the improved Paint Filling. Its composition is such that the pores of the Pumice or rubbing stone are kept perfectly free and open during the entire process of rubbing, while other Fillers have a tendency to choke or fill up the pores of the stones, and thus render them useless or ineffective until cleaned or scraped off, which process is both slow and troublesome. It is therefore apparent that by the adoption of this article both labor and material would be economized. It comes in the form of a stiff Paste, *finely* ground, and when reduced to its proper consistency by the addition of Spirits Turpentine, 1 gallon will be equal to 1½ gallons of other Fillers, thus rendering it comparatively the cheapest article of the kind in the market.

From the many flattering testimonials received by the Patentee from the parties now using it a few only can be appended.

TESTIMONIALS.

MAUCH CHUNK, Pa., Sept. 26, 1870.

The article known as TULLY'S PATENT PAINT FILLER has been used for upward of three years by this Company, on Cars, Engines, Cabs, Wheels, Tenders, etc., etc., and find it an excellent substance for preparing fine surfaces, reducing the time usually spent in rubbing down one third. Wearing well, and with a fair trial, it will prove all that is claimed for it where introduced and placed before the public, as the best result of many years' experience obtained by a thoroughly practical Painter.

A. MITCHELL, *Master Mechanic,*
L. & M. Division of L. V. R. R.

We fully concur in the above.

JAMES I. BLAKESLEE, *Sup't of*
L. & M. Division of Lehigh Valley Railroad.
A. G. BROADHEAD, JR., *Sup't*
Beaver Meadow Div. L. V. R. R.
PHILIP HOFECK, *M. M., B M. Div.*
JOHN I. KINSEY, *M. M., L. V. R. R.*
DAVID CLARK, *M. M., Hazleton Div.*

Having full confidence in the men whose signatures are attached hereto, I endorse all they say, and confidently recommend Mr. TULLY'S PATENT PAINT FILLER to all in want of an article of the kind.

ROBERT SAYRE, *Sup't and Eng'r,*
Lehigh Valley Railroad.

N. B.—In addition to the *"PATENT PAINT FILLING,"* we manufacture a *Superior Belgian Varnish Filler,* designed to fill the grain of Hard and Fancy Woods used in the construction of Passenger and Sleeping Cars. By its use from *Two to Three* Coats of Varnish are saved. Also, a *Scraping Filler* for Cars, Locomotives, Cabs, etc., to be *used where great dispatch is required.*

PRICES FOR

Patent Paint Filling, Superior Belgian Varnish Filler, Scraping Filler,	$3 per gallon, in cans from 1 to 5 galls. Bbls. 10 per ct. less.

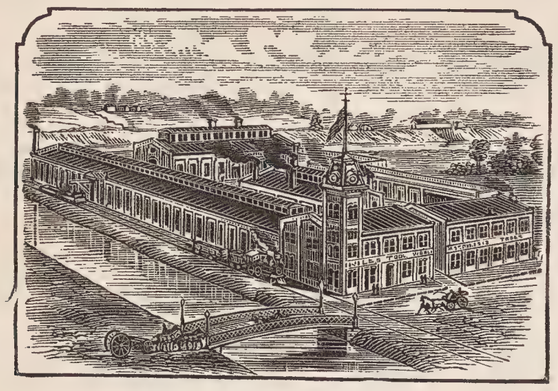
Directions for use accompany each package.

J. W. TULLY, Patentee and Gen. Agent.

ORDERS SHOULD BE ADDRESSED TO

FELTON, RAU & SIBLEY.

Machinists' Tools of Every Description.



We would call the attention of Railroad Companies and Car Builders to the superior excellence of our

Car Axle Lathes, (Gray's Patent,)
Car Wheel Borers,
Hydrostatic Wheel Presses, etc.

NILES TOOL WORKS,

Office, 131 West Second St., Cincinnati, Ohio.

PATENT ELASTIC FELT

For Car Seats, Mattresses, and Pillows.

ERIE AND ATLANTIC SLEEPING COACH CO.,
General Offices, 309 West 23d Street,
NEW-YORK, March 26, 1872.

F. W. BLOODGOOD, Esq., *President Patent Elastic Felt Co. P. O. Box 129, Jersey City, N. J.:*

DEAR SIR: Press of business and absence from the city has prevented me from saying to you earlier, that our experiment the past year, in using your Patent Elastic Felt for Pillows and Mattresses, in the coaches of this Company, has proved entirely satisfactory, and that I now regard it as decidedly preferable to hair and feathers. It does not pack like hair, is soft, durable, and withal cheaper. Respectfully yours,

WM. R. BARR, President.

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PATENT ELASTIC FELT CO.,

213 Canal Street.

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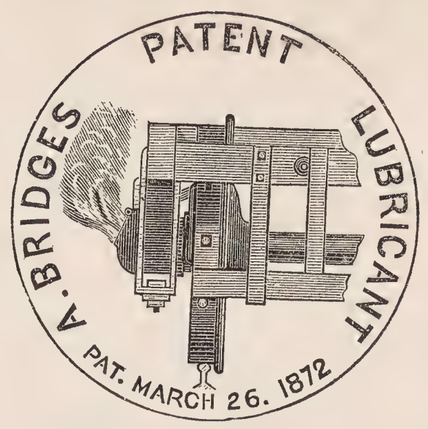
BY THE USE OF



For Railroad Car Journals and other Bearings.

In presenting this Lubricant to the notice of Railroad and Steamboat Managers and Operators in Machinery generally, I do so with a practical knowledge of its merits, and with confidence that it will be found to possess invaluable qualities as a

Lubricator and Counteractor of Friction.

It has been in use, during the past two years, on a number of Railroads and Steamers, and is highly approved of.

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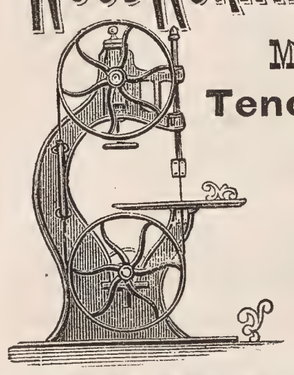

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For Railroad, Car and Agricultural Shops. Superior to any in use.

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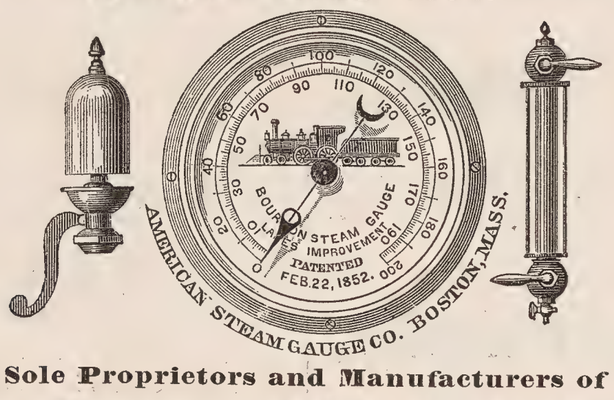

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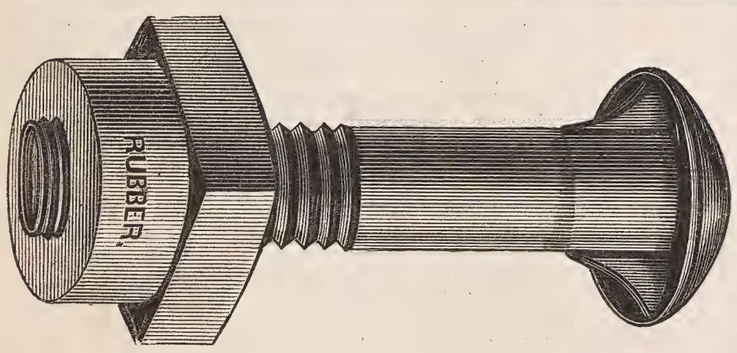

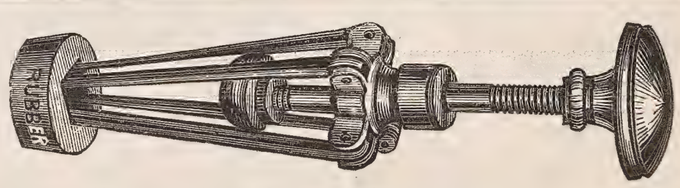

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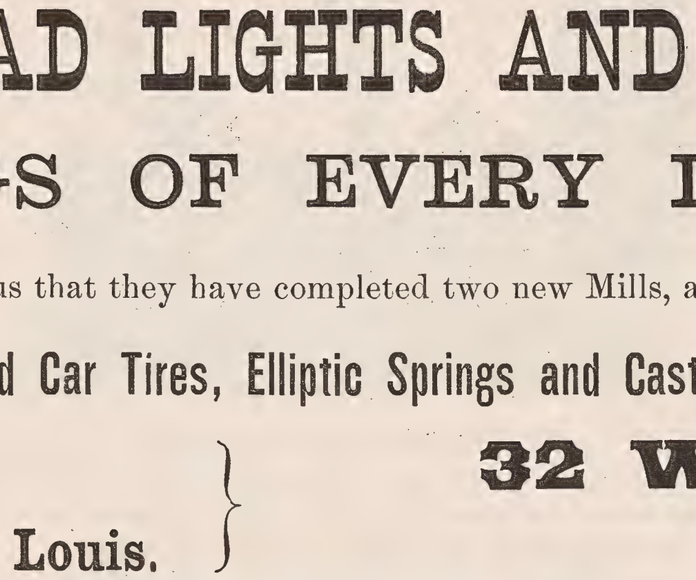

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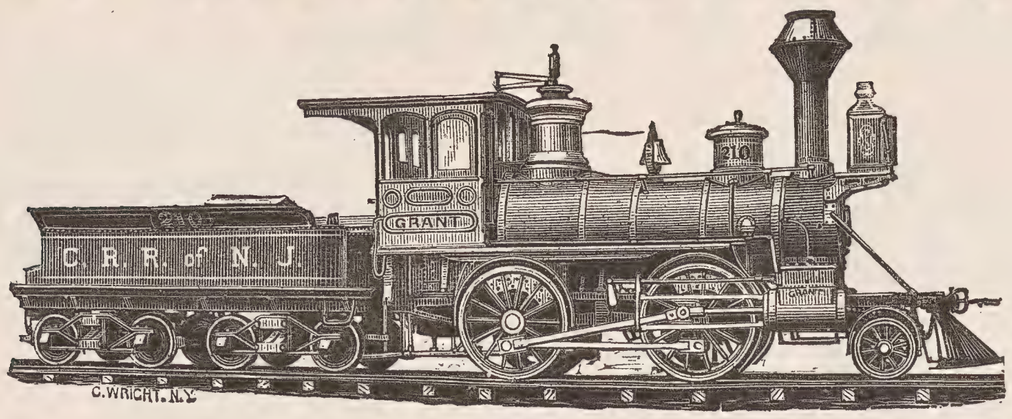

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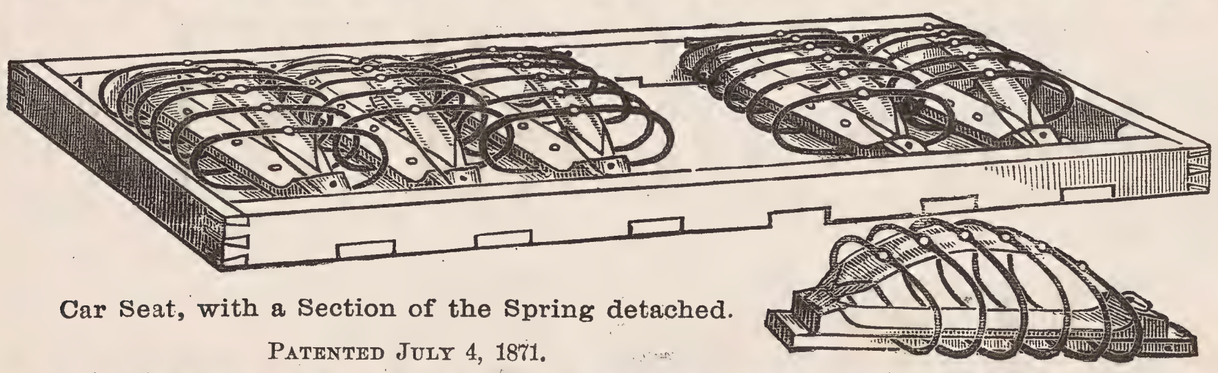

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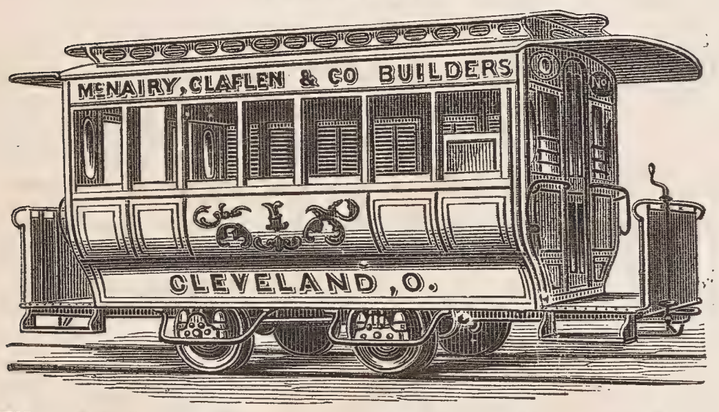

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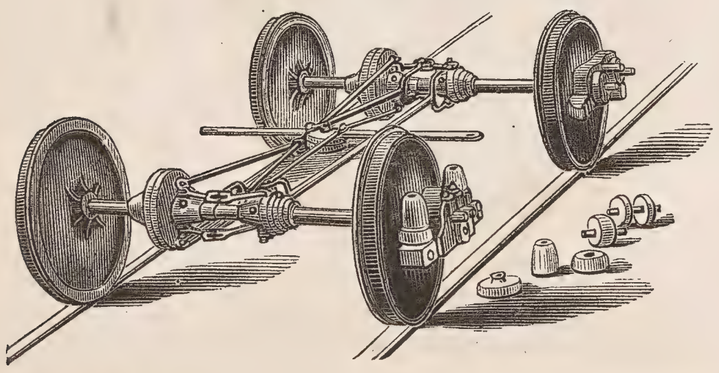

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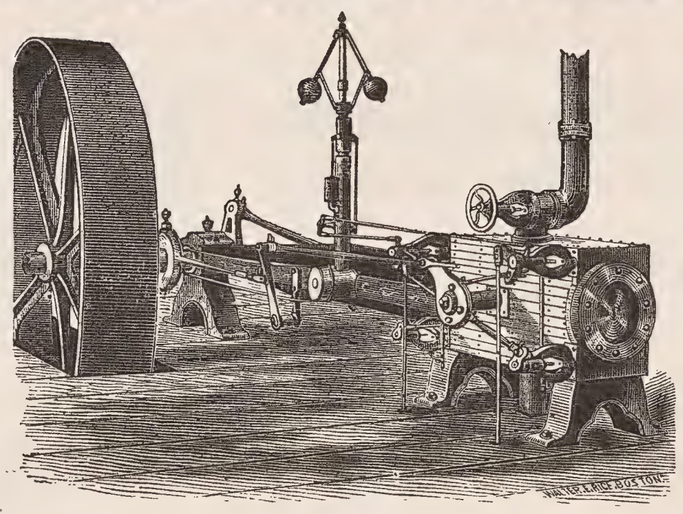

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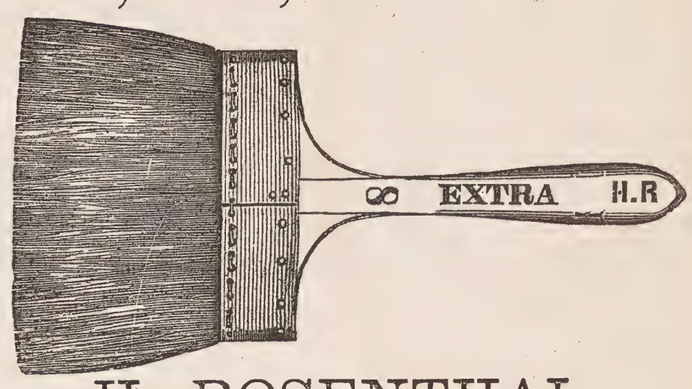

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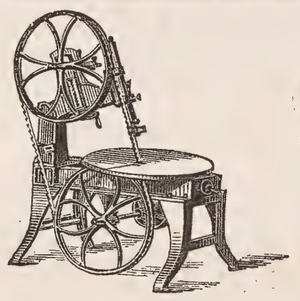

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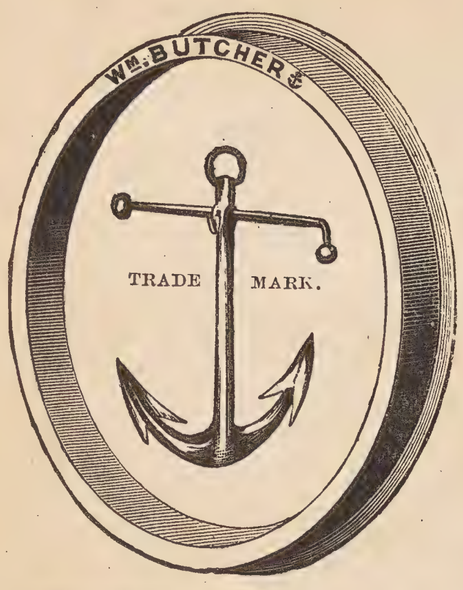

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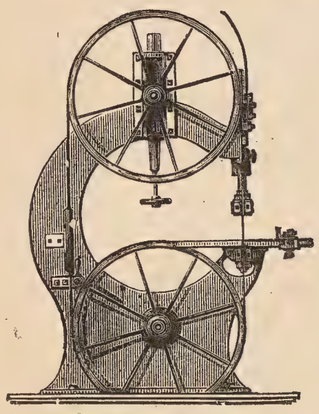

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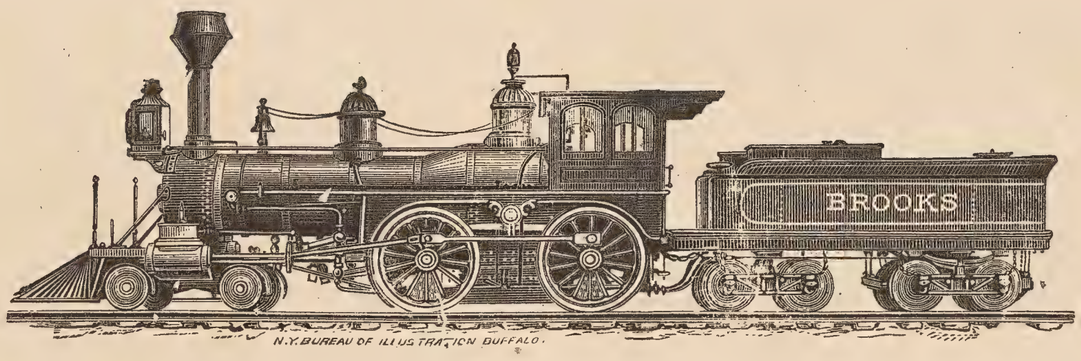

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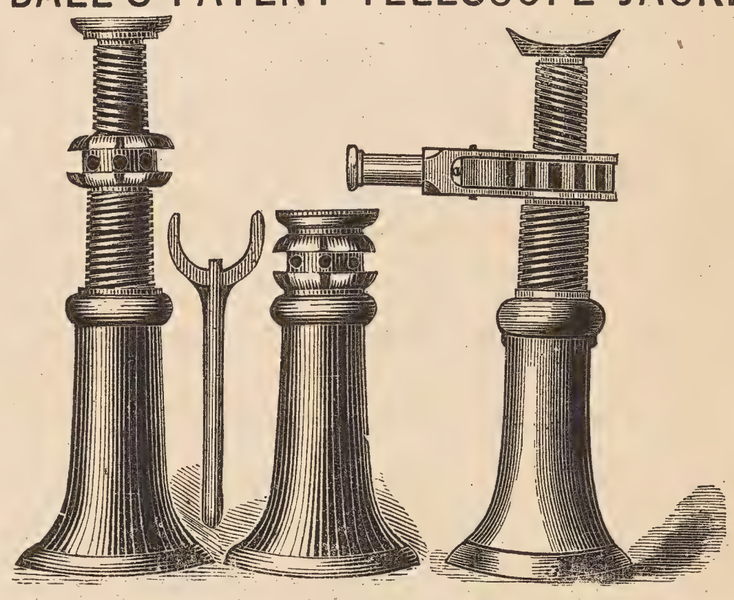

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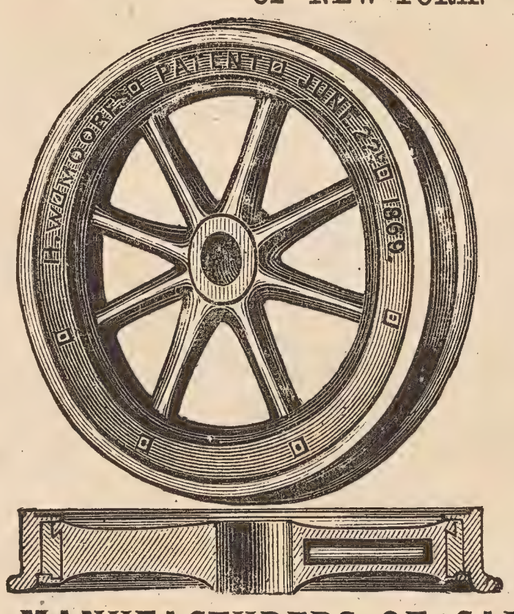

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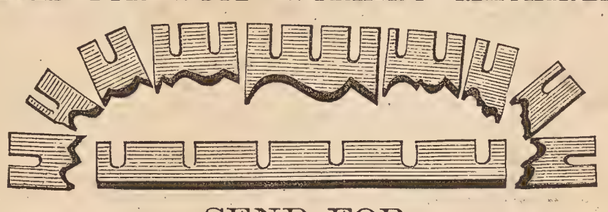

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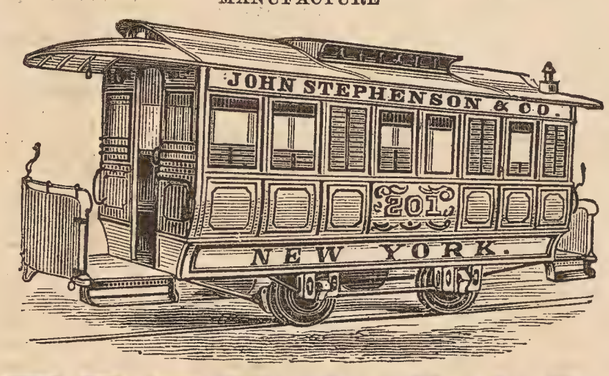

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MANUFACTURERS OF

American Charcoal Iron Boiler Tubes,

WROUGHT IRON PIPE FOR STEAM, GAS, AND WATER,

Artesian and Oil-Well Tubing and Casing,

Steam and Gas Fittings of every description, and Steam, Water, and Gas Valves.

New and Improved Machinery for

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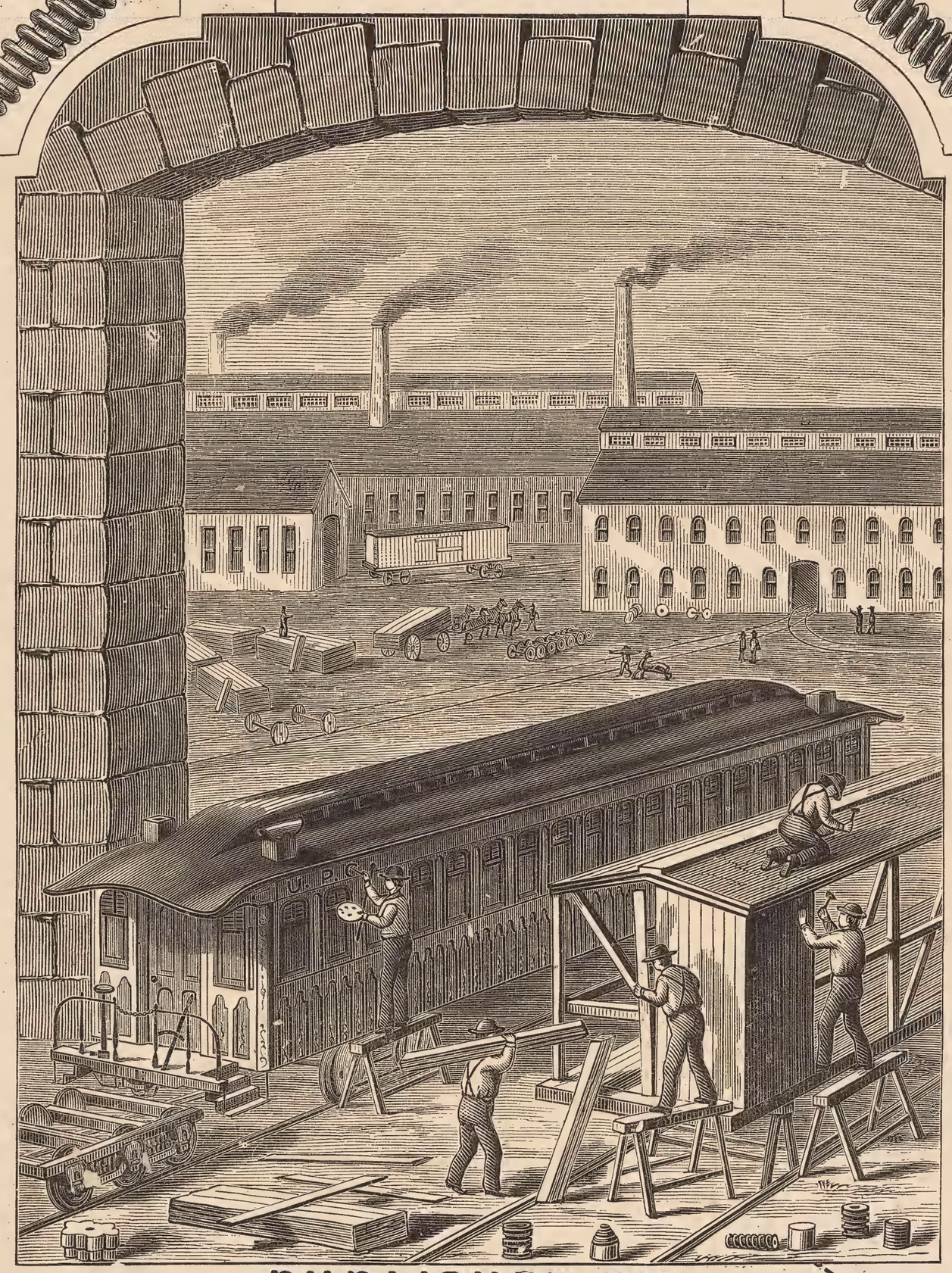
No. 15 Gold Street, New-York

S. W. Green, Printer and Stereotyper, 16 and 18 Jacob Street, New-York.

THE NATIONAL CAR BUILDER.

Devoted to the Interests of Railway Rolling Stock.

Vol. IV. JUNE, 1873. No 6.



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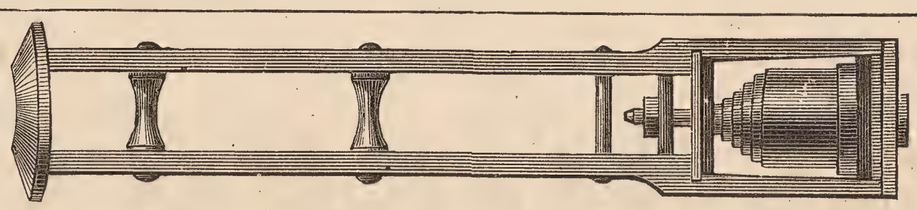

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Canada.

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DESCRIPTIVE PRICE-LIST

☞ (UNIFORM TO ALL)

OF

RAILWAY VARNISHES.

LAWSON VALENTINE.
HENRY C. VALENTINE.

MAY 1, 1873.

OFFICE: NEW-YORK.
FACTORY: BROOKLYN.

FINISHING.

FREQUENT WASHING WITH COLD WATER WILL IMPROVE ITS LUSTRE AND HASTEN ITS HARDENING.

		Per Gallon.
Railway Body Varnish, . . . *(For finishing-coats on outside of Cars.)*	This Varnish differs from the Finishing Body Varnish used on carriages, in hardening free from tack more quickly, thereby rendering it more effectual in resisting cinders and dust. It is very pale, and dries out of the way of dust in about twelve hours. In working, fulness, lustre, and durability, it is unsurpassed. On old work, one, or at the most, two coats are sufficient. On new work, it is economy to use two or more coats over our **Hard Drying Body.**	**$5 50**

RUBBING.

Hard Drying Body Varnish, . *(For under-coats outside, and finishing inside, also for finishing Locomotives.*	This Varnish dries in eight to ten hours, and hardens so as to rub well in about four days. It is fully equal to our **Railway Body** in paleness, fulness, and lustre, and is much used for finishing over a leveled surface on hurried work not requiring the greatest durability. For best inside work it is particularly adapted.	**5 00**
Quick Leveling Varnish, . . . *(For under-coats on Locomotives and inside work, or for quickening the Hard Drying Body and Railway Body.*	This Varnish dries quicker and harder than our **Hard Drying Body.** In good weather it will harden so as to rub well in two days without sweating out. It is sufficiently pale for any light work. On outside work it should be protected with our **Railway Body.**	**4 00**

MISCELLANEOUS.

No. 1 Black Varnish, ... *(For smoke-stacks and other iron work.)*	This is an Elastic Black Varnish for Smoke-stacks. It dries and wears well. A little **Railway Body** mixed with it will improve it in lustre and durability.	**1 50**
Japan Gold-Size, ... *(For binding, drying, and hardening colors.)*	This is a superior oil-drier, of light color, and strength nearly double that of ordinary Japan. On account of its paleness and the less quantity required, it is especially valuable for use with light paints, and being an oil-drier it is much less hurtful to the work than Japan. Once known, it is indispensable to Car-Painters, for binding colors, mixing roughstuffs, and facilitating their drying and hardening through	**3 50**
Crown Coach Japan, ... *(For drying and hardening paints.)*	This is a light-colored, strong-drying shellac Japan, for hardening colors, and is well adapted to the use of the car-painter.	**1 75**
Ground Roughstuff, ... *(For producing a hard and level surface on bodies of Cars.)*	This is a mixture of mineral substances, combined with great care so as to furnish a dense body with a sharp grit. It is ground in **Japan Gold-Size,** and is superior to all other roughstuffs, (sometimes erroneously called "fillings.") When used over a priming of one coat of **Permanent Wood-Filling,** the first coat should be made elastic with raw oil, and the following coats reduced with turpentine, if required for working.	**3 00**
Dark Permanent Wood-Filling, *(A patent article for priming outside work, and permanently filling and darkening natural woods.)* **Light Permanent Wood-Filling,** *(Precisely same article as above, but being light colored it fills without staining the natural wood, and is specially adapted to priming Cars.)*	This article, being a very penetrating and non-evaporating anti-damp of extreme durability, is a perfect and permanent filling for the pores of wood. Experience has proved that it will not only support the color and varnish better and longer than the old method of lead priming, but that on account of its permanent elasticity, it will neither crack nor flake off; besides which, it saves time, labor, and cost, and is more convenient, cleanly, and healthful.	**4 00**

☞ **Goods put up in 45-gallon barrels and 5-gallon sealed cans, cased, with no charge for packages. All goods in barrels 20 cents per gallon less, with 5 per cent. off for cash in 30 days.**

We claim that our ***Finishing Varnishes*** are unsurpassed in the following qualities:

UNIFORMITY, PALENESS, FLUENCY, RELIABILITY, DRYING,
HARDENING, FULNESS, BRILLIANCY, DURABILITY, ECONOMY.

Valentine & Co.

88 Chambers Street, New-York.

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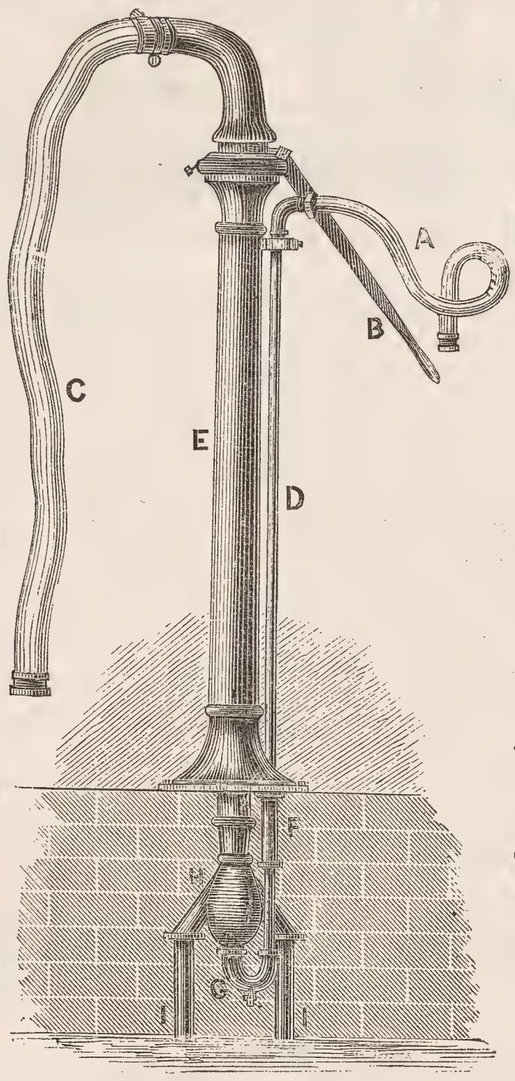
Patent Steam Railroad Water Station.

DISPENSES WITH **Tanks, Tank Houses, Stationary Power,** AND **Attendance.**

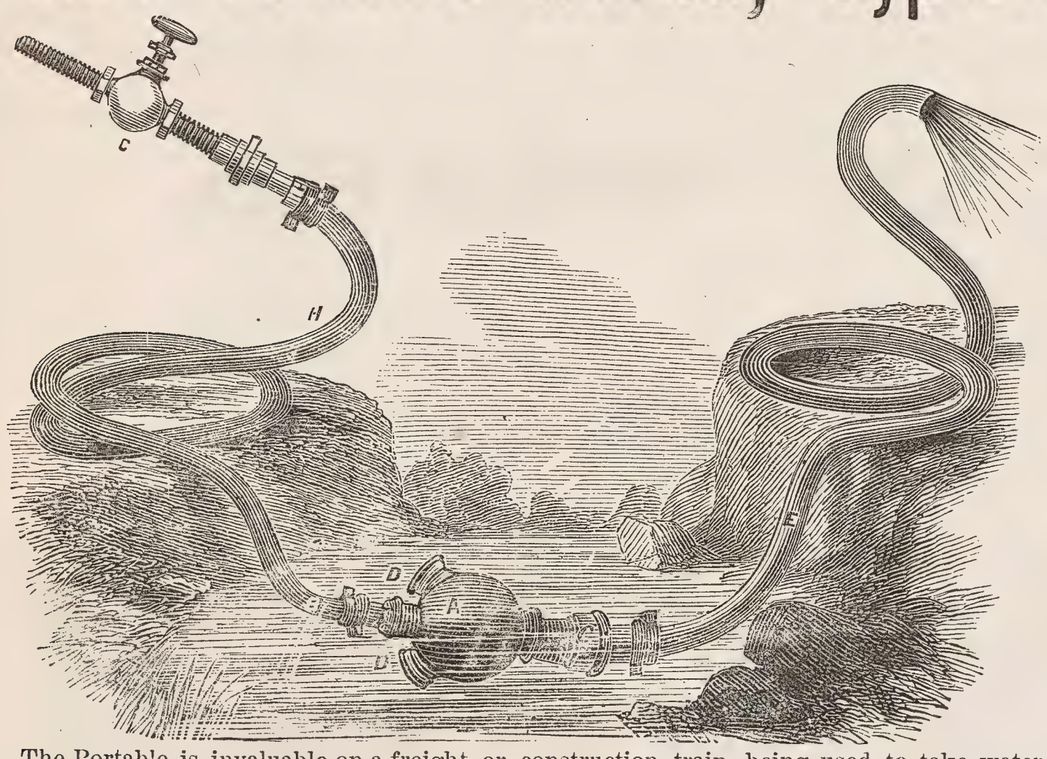


CAN NOT **FREEZE** IN ANY **CLIMATE,** UNDER ANY CIRCUMSTANCES.

Costs Less THAN ONE HALF THE PRICE OF A **Frost Proof TANK.**

The Engineer in charge of the Locomotive attaches the Hose A to a steam valve in the boiler. Steam passed through the pipe D and slip joint F into the globe H, producing a vacuum; the water is then lifted through the pipes I I and forced through the column E and hose C into the tender, filling any ordinary tender in about three minutes. When steam is shut off all the water in the pipes returns into the well, and any condensed steam passes off through the drip valve G, leaving nothing to freeze. The handle B serves to turn the discharge pipe and hose in any direction. The water delivered into the tender is warm, thus utilizing the steam used. The discharge tubes, represented above made of hose, can be made of iron if preferred.

LANSDELL'S
Patent Portable Railway Syphon.



The Portable is invaluable on a freight or construction train, being used to take water at points where there are no water stations. With it water can by taken from any point within one hundred feet of the track where there is water six inches or more in depth. The valve C is tapped into the locomotive boiler; steam is let on through the hose B; water is drawn through the orifices D D, and forced through the hose E into the tender, filling any tender with warm water in from six to twelve minutes.

Lansdell's Patent Steam Syphons, Double Suction, adopted by the United States Board of Supervisors, and approved by the Secretary of the Treasury for use on Steamboats.

For Price and particulars, apply to the General Agents of the STEAM WATER STATION COMPANY,

LENG & OGDEN,

IRON AND STEEL DEALERS AND IMPORTERS,

4 FLETCHER STREET, NEW-YORK,

Sole Agents for Credenda Steel Gun Barrels and Moulds, and the Cold Drawn Patent Weldless Steel Tubes.

Noyes' Patent Liquid Packing

FOR COOLING AND LUBRICATING

Railroad Car and Steamboat Journals of all kinds.

The attention of Railroad men, as well as all others who are running heavy journals is respectfully invited to the above Liquid Cooler. It has been successfully introduced on several Railroads, and is constantly growing in favor as its merits become known, and we are confident that practical men can not fail of being convinced that our preparation deserves their candid attention. What we claim for it is:

That it will cool a journal while a car is in motion, and that its use will in a great measure prevent its occurrence, saving expense, delays, and accidents; that mixed with mineral oil it gives a soft heavy body, essential elements which this oil lacks, especially in warm weather, besides keeping it sweet and preventing oxydation; that a journal will wear longer and with less friction, and be better and more thoroughly oiled; that the heat from the journal is thrown off at a temperature below that required to melt the babbitt, saving it from being destroyed, and preventing an accumulation of heat; that there is less liability of waste packing of journal getting on fire, as the non-inflammable elements of the Liquid permeates the waste and prevents it; that it will cause a considerable saving in the expense of oiling, as it imparts additional lubricating qualities, as well as body which prevents waste from running off, keeps the journal smooth and polished, and hardens the bearings; that a trial will satisfactorily demonstrate its superiority to sperm or lard oil, and that used according to directions it is even cheaper than mineral oil, which is the lowest-priced lubricating oil in the market.

We do not claim the Liquid Packing as a *durable* lubricator of itself alone, but when used with good mineral oil according to directions, we do claim that it constitutes a cheaper, better, and more durable lubricator than any thing offered for the purpose under whatever name.

One thorough application of the Liquid on a hot journal will do more execution in cooling, than the constant application of water for half an hour, besides doing it evenly and without loss of time.

DIRECTIONS FOR USING.

For Cooling off a Hot Journal when Cars are in Motion.—For this purpose procure a can holding two gallons, the nozzle having an outlet of not less than half an inch, and always keep it well filled with the Liquid Packing for immediate use. When a hot journal is discovered, apply the Liquid slowly, first giving the contents of the can a thorough shaking, and then proceed. Examine journal at next station, and if not cooled down to a proper temperature, apply again, and so on until it is accomplished, then fill up the box with native lubricating oil; this is particularly necessary in all cases where animal oil is used as a lubricant. In all ordinary cases this treatment will effectually cool off a journal in a short time, and without causing scarcely any delay of train. *Where a box is on fire,* pour on the Liquid which will extinguish the fire immediately. In extreme cases, where the babbitt metal has melted, or where journals are extremely rough, the journal may become hot again. If so, repeat application of Liquid as directed, and then fill up box with native oil, and so on as often as may be necessary to the end of route. A can of the Liquid Packing, together with a can of native oil, will insure the safe delivery of cars troubled with hot journals, with scarcely any delay. A smoky and hazy emanation from boxes in which the Liquid is used, simply indicates a rough journal, and that the heat is being conveyed away from it. In such cases look to it occasionally, and keep it well supplied with the Liquid. Should the Liquid become too thick to run freely from the nozzle of can, from the action of the weather, thin to the required consistency with mineral oil.

For a General Lubricator.—Add one part of Liquid Packing to two parts of native West-Virginia or paraffine oil, and use in regular way. Or, if preferred instead, use the Liquid Packing in every third or fourth oiling, according to the temperature of the weather and quality of oil. Used in this way, aside from its cooling qualities, it makes a lubricator that can not be excelled in price and quality.

WHAT RAILROAD MEN SAY OF IT.

Mr. Noyes: Fitchburg, Mass., Aug. 20, 1872.

Dear Sir: I have used your Liquid Packing for the past four months, and am perfectly well satisfied that it is the most effectual article ever in use for the purpose claimed. I have just ordered another barrel. If all railroad companies would adopt your Liquid Cooler, I think they would find a saving of nearly 20 per cent. when used with mineral or black oil according to your directions, JACOB MARSH, *Master Car-Builder Troy and Greenfield R. R.*

Mr. P. Noyes: Salem, Mass., Aug. 7, 1872.

Dear Sir: I have been using your Liquid Packing for cooling car journals, for some time past, and have been well pleased with it. I have had occasion to use it a number of times, under Pullman Cars, and it has been a complete remedy in every case of hot journals.

Every train should be provided with it, as it is a saving of time and expense in the running of trains, provided it is applied and cared for according to directions for using.

J. P. SOMERBY, *M. C. B. of Eastern Railroad.*

Mr. P. Noyes, Agent: Worcester, Mass., July 11, 1872.

Dear Sir: Please send us another barrel of your Liquid Cooler. Have been experimenting with it for the past six months, and find it all you recommend. It can not fail of accomplishing the work, and with it and a can of native oil, can deliver my cars any where in good condition. I find, however, as you stated, that it will not work with amimal oil, but with mineral oil, and when used according to your directions it works entirely satisfactory. I shall take especial pains to pass its merits along. OSGOOD BRADLEY, *Car Manufacturer.*

Office of Northern Railroad,
Mr. Noyes: Concord, N. H. May 26, 1872.

Dear Sir: Send to this corporation a barrel of your Liquid Packing. The sample package cooled four hot boxes within a distance of eight miles. I shall have a can on board each train, for it gives perfect satisfaction. A. LANGMAID.

P. Noyes, Esq.: Albany, Nov. 1, 1872.

Dear Sir: I received the barrel of Liquid Packing you sent me for trial, and gave it out to our most experienced conductors to use according to directions. Below please find their report:

We, the undersigned, Freight Conductors on the Eastern Division of the N. Y. C. & H. R. R. R., have used the Liquid Packing furnished by Mr. Jones, and find that when we arrive at a station with a hot journal, the Liquid Packing cools it sufficiently by the time we arrive at the next station to use the Black Oil, and then have no trouble in getting through with it. It is the best we ever used. R. H. Fisher, A. W. Getmans, R. H. Heath, Wm. Hess, Conductors E. Div. N. Y. C. R. R.; I. Ferguson, Conductor H. R. R.R.

JOSEPH JONES, *M. M. N. Y. C. & H. R. R. R., E. Div.*

New-York, Providence, and Boston R. R. Co.,
Belt and Leather Stuffing Co.: Providence, Aug. 3, 1870.

Gentlemen: Some two months since I received from you a can (1½ galls.) of your Liquid Packing for cooling Journal Bearings on cars; I had just repaired and put to running an engine; the first trip the truck boxes (all new) heated badly. I gave the Liquid Packing to the engineer and instructed him to use it according to directions. The consequence was that we had no more hot truck boxes. I was so well satisfied with it that I ordered a barrel, and for the past month, when we have a hot box on any of our cars, we apply at once your Liquid Packing, which has in all cases, thus far, cooled the journal so as to give no further trouble or delay. During the past two weeks we have received from the Taunton Car Co. four new passenger cars; the two first when received by us from Taunton had each journal VERY HOT, with the babbitt metal melted out of brass shells, I renewed the metals and packed them with your Liquid Packing. The cars have been running 150 miles each day ever since, WITH NO MORE HOT BOXES. Some ten days since we received from the N. L. & N. H. R. R., at the Ferry Boat at Groton, (through express train from New-York to Boston, shore line,) a car having a red-hot box; your Packing was at once applied, cooling the journal so that the men were able in a few moments to put in a new metal; they then repacked with your Liquid Packing, according to your printed directions, and the car came into Providence, a distance of sixty-three miles, perfectly cool, without any further trouble. If it continues to work as well, I can not do without it. I cheerfully recommend it to all Railroads, as being an article which they will find invaluable in all cases of hot journals.

J. H. ANDERSON, *Master Mechanic.*

Send for a barrel. No charge unless it does all we state.

MANUFACTURED BY THE

BELT AND LEATHER STUFFING CO.,

47 INDIA STREET, BOSTON.

Also Belt Dressing for preserving belts, and preventing them from slipping, and Cabinet Oil Tanks for storing, drawing, and measuring oil, of all sizes.

FULLER, LORD & CO.,

Machine-Forged Nuts,

BOLTS and NUTS,

WROUGHT WASHERS,

BOONTON CUT NAILS,

139 Greenwich, Street,

NEW-YORK.

NATIONAL

LOCOMOTIVE AND MACHINE WORKS.

DAWSON & BAILY,

MANUFACTURERS OF

LOCOMOTIVES.

Narrow Gauge Locomotives a Specialty.

OFFICE AND WORKS

AT CONNELLSVILLE, PENN.

Hitchcock Car Ventilator.

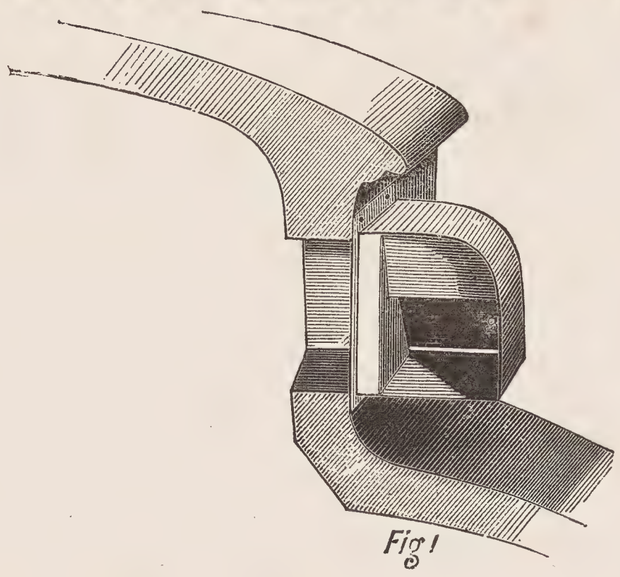
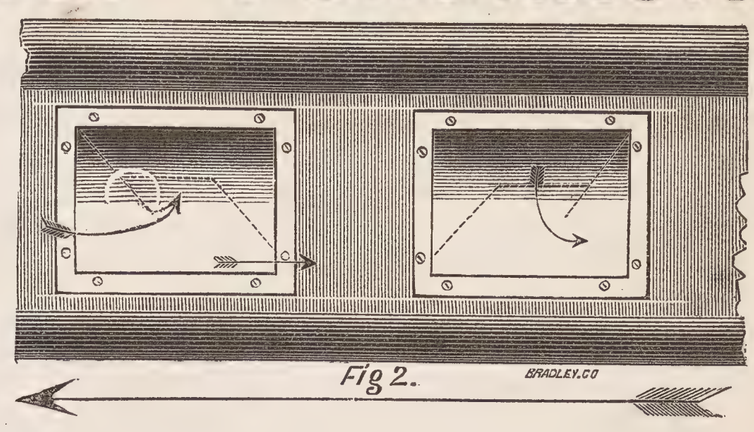


Fig 1



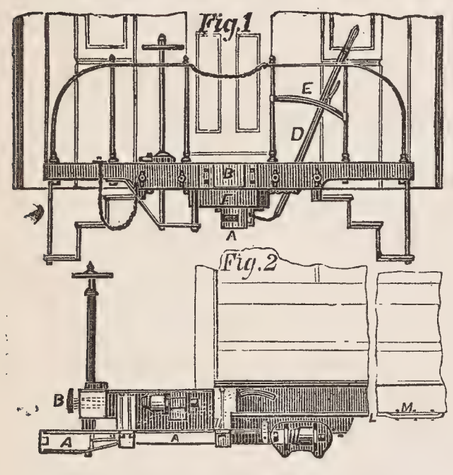
THE Ventilators are placed as usual in the car roof as shown in Fig. 1, their mouths facing alternately in opposite directions, those facing forward admitting the air, and those facing backward affording an exit. Fig. 2 represents a side section of the raised roof with two of the ventilators alternately arranged. When the car is moving in the direction indicated by the arrow, it will be seen, by the curved darts, that there is an ingress and egress of air constantly taking place. The operation of the ventilators is reversed with precisely the same effect, when the car moves in the opposite direction. The internal structure is such that the dust and cinders passing into the mouth of the ventilator are intercepted by striking against two shields, shown in Fig. 1, and indicated by dotted lines in Fig. 2, and are thus naturally thrown to the bottom, where they are carried out through a small opening as shown in Fig. 1, and by the straight dart in Fig. 2, a current of pure air being forced into the car at the same time through a lateral opening. The faster the car moves, the greater is the quantity of air admitted and expelled, thus securing a free circulation which does not subject the occupants to a direct current or draught. The ventilator is also noiseless in its operation. There is no clattering of valves, and no change is necessary when the car reaches its destination. Once put in place, it is always in readiness, and runs itself independent of all employees.

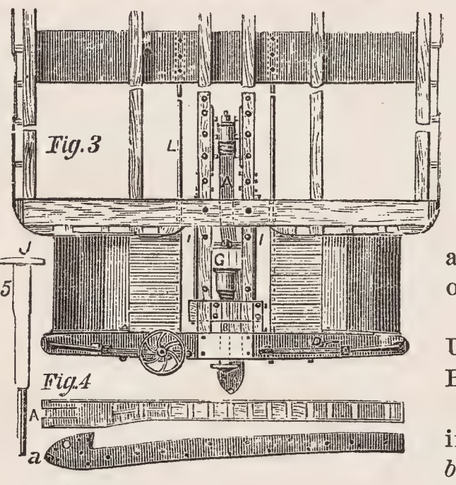
H. D. CARROLL & CO., Springfield, Mass.,

Proprietors and Manufacturers.

ROBERT HITCHCOCK, Inventor.

MILLER'S TRUSSED PLATFORMS. Compression Buffers and Automatic Couplers for Railroad Passenger Cars.





Office, 231 Broadway, (Rooms 4 and 5,) New-York.

Send for Illustrated Pamphlet, and call and see working models. **E. MILLER, Patentee**

DESCRIPTION.

Figure 1 is an elevation; Figure 2, a longitudinal section; Figure 3, a plan or an end of a car to which the arrangement has been applied: and Figures 4 and 5 show top and side views of the "Hook" and "Buffer," drawn on a larger scale than that of Figures 1, 2, and 3.

The letters refer to the same parts in all the figures. A is the coupling "Hook," B the "Buffer," C the "Stop," D the "Lever," E the "Quadrant Ratchet," F the "Truss Beam," G the "Spring Beam," H the "Suspender Beam," I the "Upward Trusses," K the "Main Spring," L the "Downward Trusses," and M the "Bolster."

The Platforms, instead of being located below the centre line of the main sills of the cars, are placed *in* that ine, and held there by the Trusses I and L, so that the point of contact (in Buffers B) is *in* the said centre line and *not below* it.

The coupling "Hook" A is attached to the draw spring the same as the ordinary draw head, and at the same height above the track, but in such a manner that the outer end is free to move laterally for a short distance. The Coupling Hook projects beyond the platform. The Stop C is placed under the Buffer Beam to prevent accidental uncoupling. When two cars are brought together, the Coupling Hooks, from *their shape*, push each other aside, until the Buffers B are compressed hard on the Buffer Springs, then—*the points of the hooks having passed each other sufficiently far*—the Hooks are carried forward by their main-springs, and thus the "*Coupling*" and "*Compression*" are both effected automatically *and at the same time*, and without the use of links and pins. When two cars are thus coupled together, the *head* of the *Hook* of each car is under the Buffer Beam of its opposite car, and the platforms are close together, (about 4 inches apart.) The effect of this is, *one platform can not be forced over the other*, nor can a *child* fall between the platforms; the dust and rain are nearly all shut out; the "Compression" makes the train run steadily, and prevents all jerking at starting and stopping.

DELAWARE CAR WORKS,

Manufacturers of Sleeping, Saloon, Drawing-Room, and Passenger Cars. Employs 900 Men.

HARRISBURG FOUNDRY AND Machine Company,

HARRISBURG, Pa.

Manufacture all kinds of Machinists' and Car-Builders' Tools, for working Iron, such as Lathes, Planers, Sloting Machines, Horizontal Drilling and Boring Machines, Vertical Drills, all sizes, Shaping Machines, Bolt Cutters, Nut Tappers, Car Wheel Borers, Hydraulic Wheel Press, Axle Lathes, etc. Patent Sectional Tubular Boiler, safety and great economy at moderate cost.

Also Oil Tank Cars, Boiler and Sheet Iron Work of all kinds, Foundry Cupolas, Cranes, Ladles, etc.

SAMUEL FISKE,
General Manager.

SAFE CAR LAMP.

MINERAL SPERM OIL.

WILLIAMS, PAGE & COMP'Y, BOSTON,

Manufacturers of their well-known Car Lamps, and of superior Car Candle Lamps, are making **Mineral Sperm Oil Lamps,** now used by all the roads in Massachusetts, and many other roads East and West, and by many of the Pullman Palace Cars, in place of Kerosene or Candles. Circulars, Lithograph, and Price-List sent when requested.

WILLIAMS, PAGE & CO.

S. P. SMITH,

ORIGINAL MANUFACTURER OF

NEWARK VARNISHES,

369, 371, 373 and 375 Mulberry Street,

NEWARK, N. J.

Wearing Body.—For finishing, or last coat on railroad cars, coach bodies, and all work exposed to the weather. Works free under the brush, flows down smoothly, has a brilliant gloss, and is very durable.

Wearing Body, Quick Drying.—Is used for the same purposes as the Wearing Body.

Wearing Carriage.—For last, or finishing coats, on running or gearing parts; is sometimes used as a Medium Body Varnish; its working and durable qualities are like the Wearing Body.

Hard Drying Body.—Is used on second-class cars, locomotives, and for last or finishing coats, on ordinary coach bodies; works free, has a good gloss, and is durable.

Rubbing.—For first coats, or filling-up, for fitting and preparing ground work for the finishing coat; works very free under the brush, flows smoothly, and will not sweat out if not rubbed before it is dry.

Coach Painters' Japan.—Is used as a dryer in varnish, paints, oils, etc., will not curdle, but mix readily, and is a strong dryer.

Black Asphaltum.—Is used for smokepipes, iron railings, castings, hardware, saddlery, and iron work generally.

Polishing, Quick Drying, Extra Light Shade.—For the inside work of railroad cars, for pianos, light furniture etc., etc.

Shipped in Newark or New-York, free of charge. Address S P. SMITH, Newark, N. J.

I X L METAL CO.

Office and Foundry, No. 7 North Third Street, ST. LOUIS, MO.,

Manufacturers of and Dealers in the celebrated

I X L ANTI-FRICTION METAL AND JOURNAL BEARINGS.

All kinds of Brass Castings made to order. Especial attention paid to Railroad and Steamboat Work.

WE REFER, BY PERMISSION, TO

C. S. BUCK, Master Car-Builder of St. Louis, Kansas City and Northern Railway.
CHAS. W. GARDINER, Treasurer and Purchasing Agent of St. Louis and Southeastern Railway.
CHAS. R. PEDDLE, Superintendent M. P. and M. of St. L., V., T. H. and I. R. R.
O. A. HAYNES, Master Mechanic St. Louis and Iron Mountain Railroad.
LITCHFIELD CAR MANUFACTURING CO., Litchfield, Ills.
QUEALY CAR AND IRON WORKS, Hannibal, Mo.
MISSOURI CAR AND FOUNDRY CO., St. Louis, Mo.

WILLARD HAWES & CO.,

IMPORTERS AND DEALERS IN

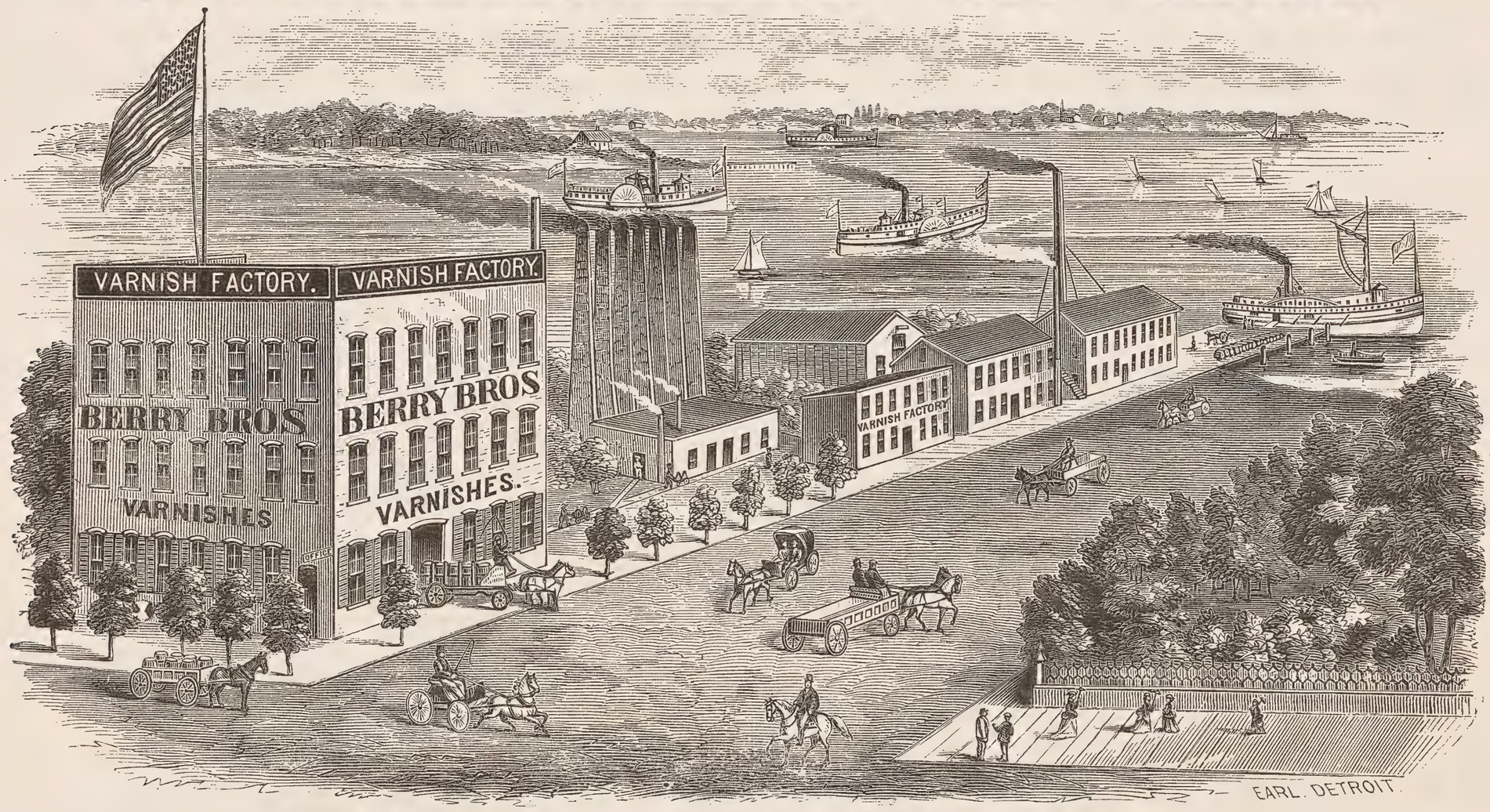
Rosewood, Mahogany, WALNUT, FANCY WOODS and VENEERS,

370 and 372 Washington Street,

Yard and Steam Saw-Mill, Foot 8th Street, E. R

NEW-YORK.

ESTABLISHED IN 1858.



BERRY BROTHERS,

MANUFACTURERS OF

FINE VARNISHES,

DETROIT, MICH.

THE TANITE CO.,

Stroudsburg, Monroe Co., Pa.

LIST OF TOOLS

Absolutely necessary, as File, Time, and Labor Savers to all Manufacturers of Iron Bridges, Locomotives, Car Wheels, Engines, Brakes, Cars and Railroad Fittings and Supplies:

The Tanite Co.'s Saw Gummer,	$ 15
The Tanite Co.'s No. 1 Emery Grinder,	30
The Tanite Co.'s No. 1 Emery Grinder on table,	50
The Tanite Co.'s No. 2 Emery Grinder,	50
The Tanite Co.'s No. 2 Emery Grinder, on table,	75
The Tanite Co.'s No. 3 Emery Grinder,	110
The Tanite Co.'s Diamond Tools,	15

Tanite Emery Wheels of all sizes, to suit the above machines. Beveled Wheels to gum saws with. Round, Square, Beveled, Double-beveled and Concave, to Grind Moulding Bits for woodworkers in car-shops. Wheels to *shape* Lathe Tools. Wheels to grind off Chilled Edges. Wheels to rough-grind Heavy Castings.

Our lately improved No. 3 Grinder ($110) is a splendid machine, solid and substantial, and calculated to carry 18 to 24 inch wheels. Send for Photograph of this. ALL of the above Goods are directly manufactured by ourselves.

For Illustrated Circulars, address

THE TANITE CO.,

Stroudsburg, Monroe Co., Pa.

THE BUFFALO CAR COMPANY,

BUFFALO, N. Y.,

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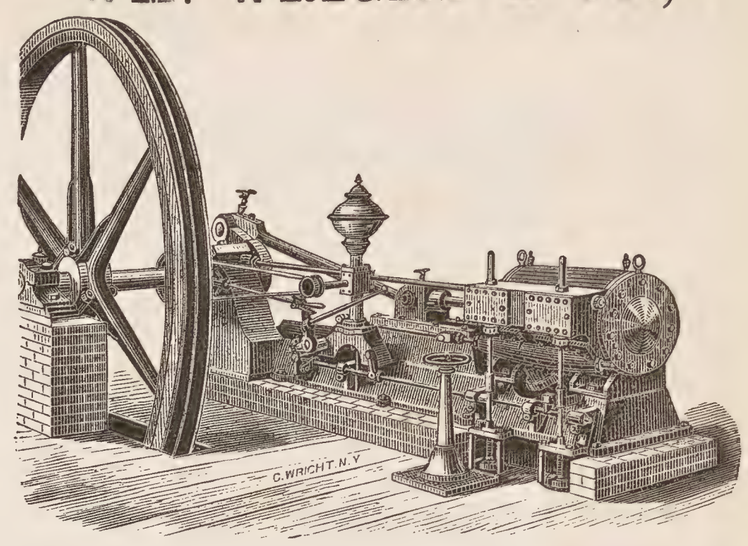

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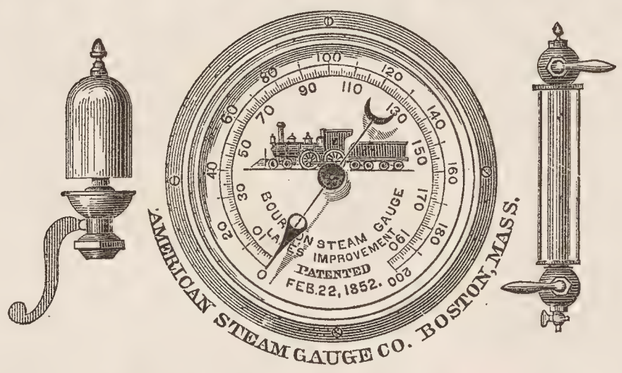

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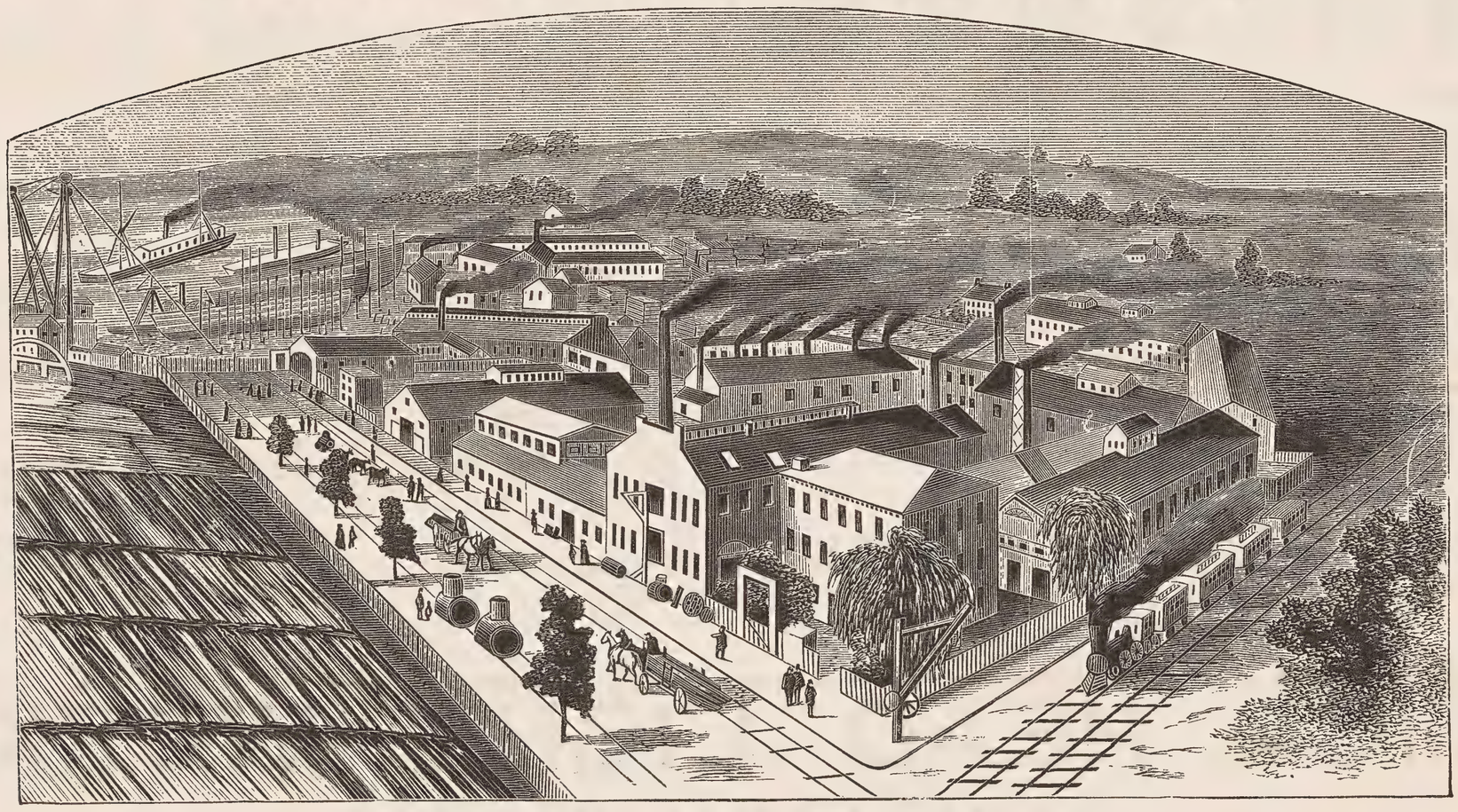

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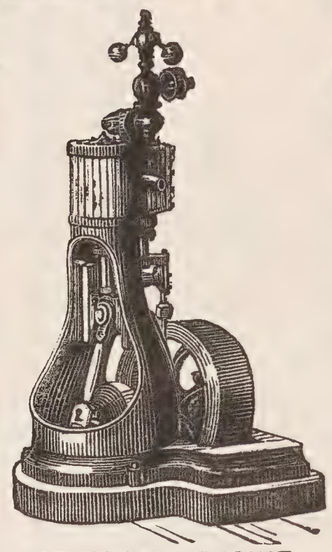

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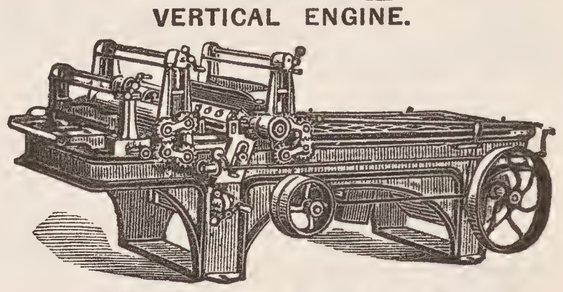

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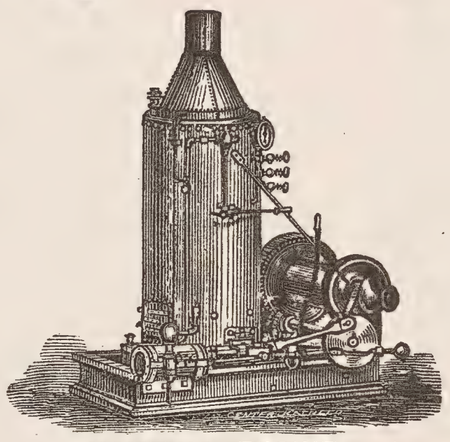

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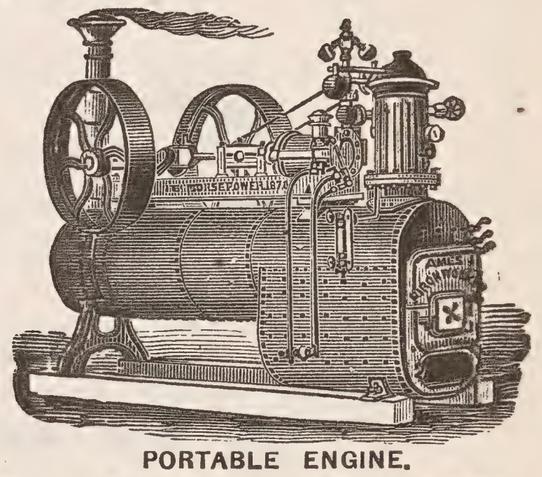

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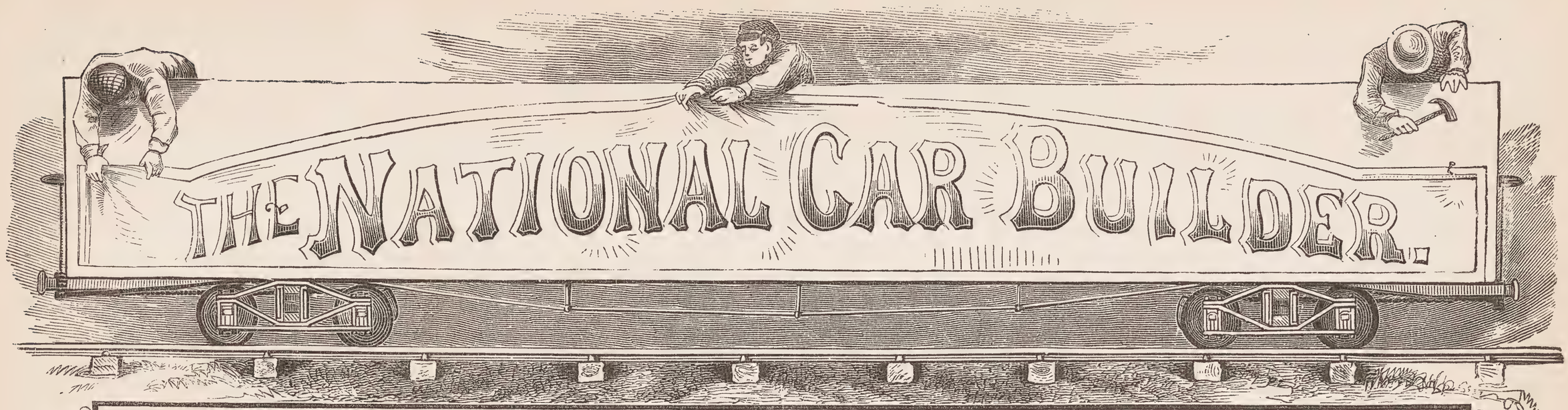

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Vol. IV. No. 6. | JUNE, 1873. | One Dollar per Annum. Single Copies, 10 Cents.

American Railway Master Mechanics' Association.

THE sixth annual convention of this association was held in Raine's Hall, Baltimore, commencing May 13th. The convention was called to order by the President, H. M. Britton, of Cincinnati. About one hundred members answered to their names on the calling of the roll, which number was subsequently increased by additional arrivals to not less than one hundred and fifty.

Mr. J. H. Setchel, of Cincinnati, Secretary of the association, presented the official minutes of the proceedings of the last annual meeting, which were approved.

Seventeen new members signed the constitution and by-laws, and were received into the association.

Mr. Britton, the President, then made a brief opening address, in which he congratulated the association on its sixth annual assemblage, and the evidences of prosperity afforded by each succeeding year. Referring to the great progress which is being made in the mechanical arts, he thought there was danger that too much might be expected from railways. There was a limit to the capacities of machinery, beyond which it could not be economically operated. Producers and manufacturers needed enlightening on this point, and the association could not better contribute to that end than by annual meetings and discussions. He thought these meetings were greatly advantageous to railways, and that if the reports and discussions were carefully read by their superior officers, they would be convinced that it was for the interest of the roads that master mechanics should attend such meetings.

The Secretary submitted his annual report, showing that within the past two years eleven members of the association have requested their names to be dropped from the list; five on account of being engaged in other business, two on account of not being able to pay their dues, one on account of not being able to attend the convention, and three assigned no reason. Seven members have joined since the last meeting. The total number of members at present is 222. The total receipts during the last year were $2067. The total amount due on assessments for delinquent members is $502

LOCOMOTIVE BOILERS.

Mr. H. A. Towne, of the Hannibal and St. Joseph Railroad, submitted a lengthy report from the committee on the operation and management of locomotive boilers. The committee have no faith in any of the patent devices which are advertised as sure preventives of incrustation. The only effectual remedy is to use pure water. Some attempts have been made to purify water impregnated with mineral substances before it is allowed to enter the boiler, but the results have been indifferent. For locomotives, the only remedy suggested is the use of rain-water. The committee make a calculation to show that the storing of rain-water in reservoirs in sufficient quantities is practicable. In Missouri, for instance, the annual rain-fall is forty-one inches. A reservoir covering one acre, and having a depth of sixteen to eighteen feet, with a roof or collecting surface of four acres, would receive 4,573,810 gallons of water in a year. On a section of one hundred miles of railroad, five of these reservoirs, located at intervals of twenty miles, would receive 22,869,000 gallons. A locomotive that does an average year's work (31,200 miles) consumes about 1,039,500 gallons of water; if the tonnage over the given section required the use of twenty engines, the five reservoirs would contain more than enough to supply them. The committee are of the opinion that in the course of time the saving in repairs to boilers would repay the amount expended in constructing these reservoirs. The annual cost of repairs to a locomotive, made necessary by the use of impure water, is about $750.

The use of river water is recommended wherever it can be procured, and even ponds may be made available when they happen to be located near the railroad. In this way the average quality of the water may be improved and average loss occasioned by incrustation may be diminished.

After some discussion, the report was adopted and the committee continued.

FUEL FOR LOCOMOTIVES.

The committee on the comparative value of anthracite and bituminous coal, and wood, as fuel for locomotives, reported progress and were continued. A discussion on the subject followed, in which a number of gentlemen participated.

SECOND DAY.

Mr. W. A. Robinson, of the Great Western of Canada, thought that some better system should be adopted in regard to reports of mileage and consumption of fuel. He had corresponded with some twenty railroads in Europe, and all agree that the best results come from thorough and systematic firing. His experience was that the simplest engines were the best. and that in this country the smoke-boxes are too small, being from 30 to 50 per cent smaller than those in use in Europe. In the European boxes there is room for two men to sit when the door is shut, while ours do not allow one man to get inside. On the whole, he favored the burning of wood, having had more experience with it.

Mr. Wells, of the J. M. & I. R.R., said that he thought the large boxes would act as air-chambers in equalizing the draught. In the small box the vacuum would be carried sooner into the fire-box and act with greater rapidity. With a small box the coals would be lifted with each exhaust from the grates. With a large box the draught would be gradual and even. The large box would be at a disadvantage if it had a flat bottom. The particles of coal would settle down and be carried around, abrading the pipe.

Mr. J. L. White, of the E. & C. R. R., said that he used copper fire-boxes and copper flues some years ago, and found that the particles of coal would scour the tubes out so that in time they would collapse. Indeed, nothing became more common. The copper fire-boxes scoured out also, wearing thin by the abrasion. A large fire-box ran better than a small one, burnt better and lasted longer. With the enlargement of the smoke-boxes he found that the draught was more uniform and constant, producing better results.

Mr. Wilson Eddy, of the B. & A. R. R., said that it was well known that brass tubes wore away very fast, but he thought the matter was not fully tested. If brass tubes were put up of an adequate thickness, he thought that a great deal of such trouble would be obviated. In regard to the smoke-boxes, the exhaust pipes should be adjusted to their size. With wood, he thought the smoke-box should be small, so as to produce a quick, sharp blast; then leaving an interval for the fire to recover. The size of the smoke-boxes had little influence; it was the adjustment of the pipes.

Mr. Fry asked what was the action produced on fire-boxes and tubes by the burning of coal? If the effect produced is chemical, steel fire-boxes and iron tubes should be used; if the effect produced is mechanical, copper fire-boxes and brass tubes must be used.

Mr. Robinson said that the brass and copper tubes conducted heat better than iron. Brass can be made hard and tough enough to burn coal. It is better for coal-burning as far as economy of fuel goes. In regard to the working expenses, he thought that they were as good as iron, except that its first expense was greater, and the cost of renewing was also greater. On his road they had to scrape and clean iron tubes every two years, while it was only necessary in brass tubes every three or four years, making a great saving of time and labor. In Europe they last from six to seven years, during which time they need new ends at the fire box ends, and then the boiler is good for three years more.

CONTINUOUS TRAIN-BRAKES.

Mr. J. M. Boon, of the Pa. R. R., from the committee on the construction, operation, and cost of maintaining continuous train-brakes, made a report, giving the experience of various roads as compiled from the replies of the officials to the questions addressed. Improvements in regard to the Westinghouse brake were reported to have been made, by which the brake could be applied from any car, so that in case of the breaking of a coupling, the detached section could be stopped independently of the rest of the train. The effect upon the wear of wheels was considered, and statistics upon the subject presented. The replies indicated that the air-brake was considered as very effective in preventing accidents. There are some complaints in regard to the pump, the defects being in the valves. The danger of the brake not working when needed and the braking of a train into sections were discussed, and it was thought that such danger could be obviated by simple means. The committee find that the saving of expense by the air-brake, in regard to the wear and tear of the wheels and other machi-

nery, is very great and justify its use from an economical point of view. The safety of the passengers also demands its adoption. The defects in the pump-valve are caused by inexperience in the management of the pump, and with practice will disappear. The committee think that much of the complaint against the complicated nature of the apparatus arises from the fact that it is as yet a new thing. The air-brake was on the whole commended as being the best brake yet in use.

Mr. Charles Graham, from the committee on the application of compression brakes, also made a report in which the merits of various compression brakes were considered, and their immense superiority to the old hand-brakes was asserted. Both reports were accepted.

OPERATING COST OF GAUGES.

The next subject taken up was the relative cost of operating roads of 3 feet 6 inches gauge or less, and those of the ordinary standard gauge. No report has been prepared, but in lieu of it a paper prepared by Mr. W. W. Evans, of New-York, was presented and read to the convention. The views embodied in the document were decidedly adverse to the adoption of the narrow-gauge system. Some discussion followed.

Mr. Sprague contended that the paper did not cover the whole ground. He did not think that the narrow gauge would do for a substitute for standard gauge railways in thickly settled countries where there is a large traffic, but that in some sections, where there is not a great deal of means to equip railroads, narrow-gauge roads would be very desirable.

Mr. Hudson thought that it would be better to save expenses by using light irons and engines, but make a standard gauge, so that as the use of the road increased, the heavy engines and rails could be substituted, and the gauge would be all right. He recollected when engines weighing only eight tons had been used, and did great service.

Mr. Setchel thought that the width of the gauge should depend upon the region through which it was to be built. Where there are sharp curves, steep grades, and where the road is for temporary use, he thought narrow gauges were best adapted. Otherwise the standard gauge should always be used. The rails may be made light, as also the rolling-stock, but if the gauge is right, heavier rails and rolling-stock can be introduced, when needed, without expense for alterations. Those roads which have been built narrow-gauged will in time become standard by the force of public opinion.

Mr. J. J. Smith, of Pittsburg, said he had great experience in narrow-gauge roads. He had built locomotives from eight to forty tons, and that now locomotives weighing four tons could be built and operated. He instanced a case where a narrow-gauge road was built and operated to great advantage, where it would have been impossible to construct a wide-gauge. He spoke of the construction of small locomotives, and the number of horses and mules their use superseded. He had made locomotives to run on twelve-pound rails. He only advocated the narrow-gauge as feeders to the standard gauge, to penetrate rough sections of country. For carrying lumber, coal and iron, they are unequaled; for carrying stock or passengers they are not adapted.

After considerable discussion, the paper submitted by Mr. Evans was accepted and ordered on file.

LOCOMOTIVE CONNECTING-RODS.

The committee on the construction and operation of solid-end connecting-rods for locomotives made a report, stating that their individual experience with the solid-end rods had been so limited that they would not feel justified in deciding against their use. To their inquiries replies have been received from the representatives of twenty-six different roads and manufacturing companies from which the committee find the following: Eleven have never used them, and are of course without well-grounded preference; three have used them, but do not now, believing them more expensive and less serviceable; five have used both solid and connected with strap, but express no preference; four are using both kinds, with preference for the strap; three favor the solid end; thus showing a small minority only who favor the continuance of the solid-end rod. Report accepted.

TRAIN RESISTANCE.

The committee on resistance of trains on straight and curved tracks, and on wide and narrow-gauge roads, and with four and six-wheeled trucks, and with long and short wheel-base, stated that but nine replies were received from the 300 circulars sent out, and they contain but scant information. They, however, submit the following general remarks: Six-wheel trucks are found to produce greater resistance, and as a consequence absorb more hauling power than four-wheel trucks carrying the same weight of car. Generally speaking, six-wheel trucks do not appear to be used, except for the purpose of carrying proportionately heavy cars, such as baggage, sleeping, and others. Six-wheel trucks are safer in case of broken rails or axles, but with proper care and attention four-wheel trucks are preferable for ordinary traffic purposes. A reasonably long wheel-base seemed to be generally recommended as productive of steadier motion. It appeared that no reliable experiments had as yet been made with rolling stock to determine the exact dynamic force or resistance in pounds per ton and with different classes of trucks. It was the intention to have prosecuted a series of experiments with this object in view, but a suitable instrument for the registration of such experiments could not be obtained. The committee recommend such a series of experiments.

Report adopted, and a committee on mechanical laboratory appointed, consisting of Messrs. Robinson, Wells, and Boon.

CHECK-CHAINS.

The committee on the efficiency of check or safety-chains on engine, tender and car-trucks in lessening the danger resulting from running off the track made a voluminous report, discussing the subject thoroughly. Twenty-four replies had been received to circulars asking for information. The committee, of which Mr. Wells, of Jefferson, Ind., is chairman, express an opinion favorable to the use of them. After some discussion, Mr. Gorman, of the T. W. & W. R. R., moved that it was the sense of the convention that safety-chains should be attached to the trucks of all engines, tenders, and cars.

The motion was adopted.

Mr. Howard Fry, of the Grand Trunk Railway, made a report from the committee on anti-friction valves and valve-gearing, in which the respective values of different kinds of valves were elaborately discussed, and many facts bearing upon the subject set forth. The report was accepted.

THIRD DAY.

Mr. James Wheelock, of Worcester, Mass., was invited to read a paper he had prepared on valves and valve-motion, which was listened to with the closest attention. It was ordered on file.

Mr. J. W. Philbrick, of the Maine Central R. R., presented a report from the committee on machinery for removing snow from the track. The committee are of the opinion that no device has appeared which can be successfully substituted for the plow. The various styles of plows are: 1. Separate structures resting on truck-frames placed within their sides. 2. Plows attached to heavy cars within which men may be carried to operate them. 3. Plows attached to engines.

CAR AND LOCOMOTIVE AXLES.

Mr. M. N. Forney, of the *Railroad Gazette*, from the committee on car and locomotive axles, made a report, which states that the committee had collected information on the following points, namely: the dimensions of the standard car-axle now used; at what point they break; what proportion of breakage occurs close to the hub of the wheel on the inside, and relative proportion of breakage at other points; the diameter at the wheel-seat and centre of the axle; dimensions of driving and truck axles to approved locomotives; when fractures of such axles occur; the rule of forcing on car and locomotive wheels; the use of compound axles or axles upon which the wheels are loose or can turn independently; the difference between the resistance of a car or truck with loose and one with tight wheels in passing around curves of any given radius, and the opinion of master mechanics regarding compound axles or loose wheels. Thirty-one replies were received, the result of which the committee presented in tabular form. The committee recommend that some action be taken to establish a standard size of axles for universal use. The report states that result of replies shows that a large majority of fractures occur just inside the hub of the wheel. As to dimensions of journal, the committee deem it necessary to make further inquiries, yet feel satisfied that an increase of length over 5½ inches will be found to be in the direction of economy. To the inquiry regarding the breaking of locomotive axles, the replies were that the breakages occur almost invariably next to the hub of the wheel. With reference to the forcing on of car and locomotive wheels the committee recommend the plan of A. Whitney & Sons. The replies to questions relative to loose wheels brought forth the fact that none had had experience with such wheels, nearly all being very decided in their condemnation of all loose wheels and compound axles.

The committee was continued, and authorized to confer with the committee appointed by the Master Car-Builders' Association for the same purpose and report at the next meeting. It was also resolved that, in the opinion of the association, no practical advantages will result from the use of loose wheels or compound axles in ordinary railway service.

MISCELLANEOUS.

Mr. Morris Sellers, of Pittsburg, from the committee on machinery and appliances for removing wrecks and erecting bridges, made a report recommending a good assortment of strong lines, good blocks, jacks and hand tools, kept in a tool-car, conveniently arranged for storing the tools, and ready for immediate use. When needed they are to be handled with promptness and judgment.

The President then introduced Gen. D. D. Smith, Supervising Inspector of the Steam Vessels of the United States, who said that at the last session of Congress $100,000 was appropriated to make experiments to discover the nature of steam-boiler explosions, which will take place next September or October. The points selected will be Pittsburg or Cincinnati and Sandy Hook, New-Jersey. The speaker invited as many as could be present to witness those experiments.

Two committees of five each were appointed to witness the experiments.

A report was made by the committee on steel tires, which was accepted; although in the discussion which followed it was declared to be valueless, for the reason that the weight of engine, diameter of wheels, kind of engine, whether freight or passenger, and speed, were not given.

The convention then proceeded to the election of officers. The election resulted as follows: President, Mr. H. M. Britton, of the White Water Valley; First Vice-President, Mr. N. E. Chapman, of the C. & P. R. R.; Second Vice-President, Mr. W. A. Robinson, of the Great Western Railroad of Canada; Secretary, J. H. Setchel, of the Little Miami Railroad; Treasurer, S. J. Hayes, of the Illinois Central.

The committee on premiums reported, recommending the awarding of the first premium of $75 to E. Moyel, of Kansas and Pacific Railroad, for designs of apparatus for supplying locomotives with water. The second premium of $50 they awarded to Mr. Frank B. Philbrick, of Waterville, Maine, for design of apparatus for removing snow.

The convention then proceeded to select by ballot a place for holding the next annual meeting. The re-

sult was as follows : Chicago, 50 ; New-York, 11; Cincinnati, 7; New-Orleans, 3; St. Louis, 1; Richmond, 1. On motion, the vote was made unanimous in favor of Chicago.

Mr. Forney was invited to read a paper he had prepared on the subject of a proposed instrument for testing the motion of slide-valves. It was an able scientific treatise, thoroughly explaining the nature of the instrument, which was illustrated by diagrams. On motion, the thanks of the convention were tendered to Mr. Forney for his valuable paper.

Mr. F. B. Miles, of Philadelphia, was called upon to read a paper on "Our power and responsibility with regard to the quality of material, workmanship, and design used in railroad service."

The paper was a stirring and earnest appeal to the association, calling upon each member to exert his most strenuous efforts to increase the power and dignity of the association, and give its opinion a judicial weight upon mooted questions, and that every exertion should be made to raise the standard of quality of material, workmanship, and design to the highest possible pitch. His sentiments called forth frequent applause.

The committee on subjects for the next meeting made a report, which was accepted.

The committee on resolutions submitted a report, tendering the thanks of the association to the citizens of Baltimore for their courteous hospitality; to the officers of the various railroads who have extended favors to the association ; to the press of Baltimore for their very flattering attentions, and to the committees who cared for the association during its stay, for their many kind attentions shown to the ladies accompanying the members. The resolutions were adopted with applause.

Upon motion of Mr. Wells, the same compensation ($500) was ordered to be paid the secretary as had been paid the preceding year.

The President called attention to the fact that there was $502 due from delinquent members. Mr. Setchel stated that $70 of the amount had been received during the progress of this convention. The subject was discussed, but no action taken in the matter.

Mr. Wells offered as an amendment to the constitution providing that any member who shall be two years in arrears for annual dues shall have his name stricken from the roll, and be advised of the same by the Secretary. The amendment was adopted.

Upon motion of Mr. Coleman Sellers, a vote of thanks was given to the President and other officers of the association for the efficient manner in which they have discharged their duties.

The President returned his thanks to the members for their kindness and attention.

Upon motion, the convention adjourned *sine die.*

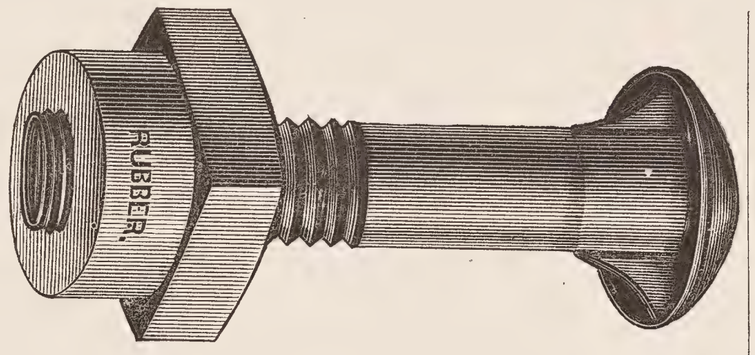
During the progress of the convention twenty-six new members were added to the roll.

The next annual meeting will take place on the second Tuesday in May, at Chicago.

THE Cummings Car-Works, at West-Bergen, N. J., have nearly completed six passenger, and three mail and baggage-cars for the Cayuga Lake Railroad. They are fine specimens of workmanship in every substantial and ornamental detail. The former are day-coaches and seat 64 passengers. The interior finish is walnut and maple—the panels of walnut burl. The seats are upholstered with crimson plush fastened with metal bands ; they also have iron ends, nickel-plated armrests, and swivel-backs. The outside is light yellow, with tasteful lettering and ornamental work. The Miller platform and coupler are used, end and side ventilators, four-wheel trucks, and check-chains. In their general appearance they are exceedingly attractive and highly creditable to the skill and taste of the builders. The works have also in progress several passenger coaches for the New-York and Oswego Midland, and the Iron Mountain Railroad of Missouri.

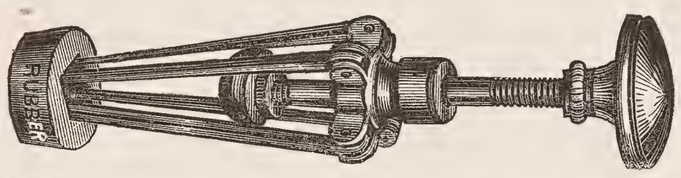
Platt & Kitzmiller's Patent Rubber Nut-Lock.

THIS invention is designed to prevent loss of iron nuts from railway car-trucks, fish-plates, and in the operation of all kinds of machinery. It consists of a rubber nut of any desired shape, with a hole in it smaller than the diameter of the bolt to which it is applied. By the use of a "spreader," this rubber nut is placed upon the bolt in contact with the iron nut, which is effectively and permanently kept in its place by the contraction of the rubber around the bolt. So great is the adhesion of the rubber, it can not be loosened by any jarring or shaking, nor by any force short of the application of a wrench to the iron nut, in which case the rubber is removed with it without injury, and is ready for immediate use on the same



BOLT WITH RUBBER NUT APPLIED.

bolt or any other of the same size. The rubber operates not only to keep the iron nut from turning on the bolt, but it also prevents the bolt from working loose and turning in the nut as it frequently does, especially in fish-plates, thus rendering the ordinary nut-locks, which aim only to secure the nut, of no use. It can be used as effectively on old bolts as on new ones ; and being made of the best quality of rubber, it is not affected by moisture or variations of temperature. Among the various incidental advantages connected with its use, we may mention that the rubber acts as a jam to the iron nut, and by pressing against it, takes



"SPREADER" FOR APPLYING RUBBER NUT.

up the slack caused by the scaling of new iron, by forcing the iron nut farther upon the bolt ; the thickness of the iron nut may be reduced one-half if necessary ; and in cases where the strain is not too severe, and there is not room on the bolt for both nuts, an iron washer may be substituted for the iron nut.

The rubber nut-lock is now in use on the Pennsylvania, Alleghany Valley, Chesapeake and Ohio, Petersburg and Richmond, Atlantic, Mississippi and Ohio, and other roads, where it has given entire satisfaction on the score of its simplicity, economy, the readiness with which it can be applied, and its practical utility for the purposes designed. For additional information apply to Vose, Dinsmore & Co., 32 Warren street, New-York.

Too Much Dead Weight.

A CORRESPONDENT of the *Railroad Gazette* writes as follows: The proper proportion of rolling stock to the work to be done has had, on local roads, less attention than perhaps any thing in relation to their management. The passenger business, generally equal in both directions, varying in different days and in direction near cities in parts of a day, close observation soon enables the superintendent to make a correct approximate estimate for each train. In thickly populated Massachusetts, the average number per train is sixty-eight, and on ten of the roads the average is only thirty-two. On many of the Western and Southern roads it is still less. What would probably be the seatage required? Would not two cars of thirty seats each be generally amply sufficient, keeping on hand, at prominent points, extra cars for extraordinary occasions? A train consisting of two passenger-cars and one mail baggage-car would weigh when loaded not over forty tons. A twelve-ton engine would give abundant power to take such a train, with additional cars when necessary, on a road with grades of over sixty feet per mile, at a speed of fifteen or twenty miles per hour. I well remember the day when the express trains on the Baltimore and Ohio Road were run between Baltimore and Cumberland, over eighty feet grades and sharp curves, by ten-ton Norris engines. It is true that the short car is not as pleasant or as easy as the long car; you might urge the same objections to street-cars or to steamboats on local routes, which can not afford the same style and luxury as those upon long through-lines. How few of our roads own an engine weighing less than twenty or twenty-five tons! My observation in travel, (and from reports,) particularly upon Western roads, is that they have too much seatage, and that the passenger-engines are entirely too heavy for the work they have to do, and that on many roads the dead weight could be reduced more than half and still offer every reasonable comfort to passengers. The speed of the passenger-train being greater than of freight, causes much more damage to the track. Therefore a reduction in their weight would materially reduce the cost of repairs of track and roadway.

Recent Patents.

AUTOMATIC CAR-BRAKE.—John E. Worthen, Mobile, Ala.—The invention has in view to connect all the brakes of a train with the mechanism on the tender or on the truck of any car. It consists in the mode of tripping the spring-rack which locks the brakes, so that the latter will be at once allowed to assume a position out of contact with the wheels. It also consists in a novel mode of automatically ungearing a drum-winding pinion from an endless screw which rotates it, so that the brake-lever will be locked at a given point and the brakes operated with a given pressure. It also consists in a novel mode of regulating the time when the ungearing of said pinion from said endless screw shall take place, so that greater or less force may be applied. It also consists in the general method of operating all the brakes of a train of cars simultaneously and with a uniform force. In going down an incline, the acquired momentum produces an immense strain upon the costly engine and racks, and greatly lessens its durability, because the brakes are applied at different times by the several brakemen. This is avoided entirely by using simultaneous brakes.

IMPROVED CAR AND CABLE COUPLING.—Winfield S. Nearing, Morris Run, Pa.—This invention relates to a new kind of clamp which is to be attached to railroad cars or other moving devices for connecting them to wire or other cables that are in motion, so that whenever such car or device is by the clamp connected to the cable it will be propelled by the same, while it will remain at rest as soon as disconnected The invention consists in constructing a clamp of two pivoted jaws which are held apart by an intermediate spring, and can be drawn together against the rope or cable by a cam-attachment to a lever that turns on a pin projecting from one of the jaws.

NEW STEAM-COUPLING FOR HEATING RAILROAD CARS.—William N. McDuffey and Benjamin F. Jaques, Petersburg, Va.—The invention consists in a coupling wherein the steam inlet and outlet valves, and the grapples which hold together the two parts, are operated simultaneously by the same device and by the same movement. The invention also consists in combining with the heating pipes or coil a pipe which carries the condensed steam back to the feed-water chamber, tank, or vessel connected therewith.

IMPROVED TURN-TABLE FOR RAILROADS.—John Enright, Cleveland, Ohio.—The invention consists in a turn-table for railroad cars or locomotives made in two parts, constructed and applicable to each other, so as to exclude dust and prevent obstructions to its easy movement. It also consists in forming a step and groove enlarged to receive lubricating material.

Among the Shops.

EDITOR OF THE NATIONAL CAR-BUILDER:

DEAR SIR: Having quite recently visited a number of New-England cities and manufacturing towns, I herewith send you some brief notices of one or two establishments, which may be of interest to your readers, especially those who are engaged in the business of car construction. Taunton, Mass., is one of those pleasant little manufacturing cities which a railway mechanic always delights to drop down upon; and as such we stepped from the cars of the New-Bedford and Taunton Branch Railroad one morning, intent upon seeing, and with genuine Yankee instinct investigating what was to be seen. The shops of

THE TAUNTON CAR COMPANY

are one of the features of the place, and pleasantly located within a few minutes' walk of the railroad depot. The various buildings, with shed and lumber-yards, occupy an area of about six acres. A change has recently been made in the management of the works, by the appointment of Mr. Milton Sessions as superintendent, a gentleman who has had twenty years' experience as a car builder, and who has during the last twelve years held the position of master car-builder of the Vermont Central Raiload, at St. Albans. His thorough knowledge of the business, agreeable manners, and mechanical ability, eminently qualify him for the position he has assumed. Mr. H. P. Aldrich, also from the Vermont Central Railroad, has accepted the position of secretary of the company, and for the duties of which he is admirably fitted by ample experience in a similar capacity on the above-named road.

While looking through the shops, we specially noticed the very substantial manner in which Mr. Sessions constructs his car-bottoms, and the common-sense principles of strength and resistance which are embodied in his method. He is no believer in "cross-sill construction," but realizes the value of a certain amount of required strength to resist a longitudinal blow. The old theory of two side-sills running lengthwise the car, with narrow cross-pieces between them, and all together forming a slight pretext for stopping any thing which happens to collide with it, is pretty thoroughly exploded, as practical experience shows that car-bottoms of such construction are more likely to be "pulverized" than otherwise, when struck by another car or engine. We found, therefore, that in these shops the floor-framing consisted of eight longitudinal sills of the best Georgia pine, two of which, (one on each side,) were set in the form of a truss, being held in that position by the transverse "spreaders" or "stiffeners" set between the sills. The entire framework is trussed transversely at the transoms, and heavy iron trusses extend longitudinally between the transoms. This method of framing renders the car bottom very strong; and with heavy end-sills and Miller trussed platforms, they are proof against "telescoping" or "egg-shelling," by which is meant the driving of the end-sills and transoms together, and into the centre of the car, as has been done in a number of instances where cars were built with cross-sills, and consequently with no capacity of longitudinal resistance. This kind of car-building is seldom met with at the present day, and but few builders adhere to this kind of framing.

Some very fine passenger-cars are in progress of construction at these shops, and others are finished and ready for delivery to various roads, including a number for the New-York Central and Hudson River. The company are also building cars of this class for Southern roads, to be forwarded by sailing vessels to their various points of destination. Our visit to these works was a very pleasant one, and impressed us very favorably with respect to the quality of work done; the cars combining the essentials of strength, lightness, durability, and comfort, with tasteful and elegant finish.

THE KINSLEY MANUFACTURING COMPANY.

The works of this company are located at Canton, Mass., a village with a population of about five thousand, situated on the east branch of the Neponset River, fourteen miles from Bostom, at the junction of the Boston and Providence and Stoughton Branch Roads. The establishment manufactures car and wagon-axles, rolled and hammered iron, and various railway supplies, including the hooks, buffers, and levers for the Miller platforms. The shops and rolling-mill cover about six acres of ground, contain twelve puddling and heating furnaces, and employ about two hundred and fifty men. We noticed here a machine for cutting the threads on carriage-axles, invented and patented by one of the foremen, which does the work very expeditiously and adjusts itself to any sized end, from five eighth to three inches. The company furnish large quantities of these axles for the California trade. We met Mr. E. R. Eager, the gentlemanly treasurer of the Company, and were shown through the shops by Mr. W. H. Little who explained the several stages through which the iron passes from the crude "pig" to the finished metal.

THE BOSTON AND ALBANY RAILROAD SHOPS.

We visited the shops of this road at Springfield, and were politely shown through the car department by Mr. F. D. Adams, the master car-builder. Several passenger-cars were in course of construction, and we here again noticed the elements of solid and substantial work. There are perhaps no better cars running on any road in the country than on the Boston and Albany. A large number have recently been equipped with the Miller platform, and the work of applying it to the old style of cars is in steady progress.

We noticed many things creditable to the management of this road, but we desire specially to mention the circulating library provided by the company for the use of their employees. This library is in Boston, and comprises a well-selected variety of books, including the standard works of current historical, biographical, and general literature, and also a department of valuable mechanical and scientific works. Every employee is furnished with a catalogue, and he can go or send at his option for the book he wants, with the privilege of retaining it six weeks.

PERONICUS.

The Transfer-Table of the West-Albany Car-Shops.

THE diagrams on the opposite page show the principle of construction and method of working of the Transfer-Table of the car department of the New-York Central and Hudson River Railroad machine-shops, at West-Albany. As these appliances are an indispensable feature of all car-shops, and as much mechanical ingenuity has been expended in the effort to overcome sundry inherent difficulties in their practical operation, our readers, we doubt not, will be interested in the somewhat detailed description we now give of the one above mentioned. The essential points to be secured in the satisfactory working of a transfer-table are, economy of power, a perfect control of its movement, a minimum of friction, slight wear and tear, and small cost of attendance. These are substantially provided for in the design and construction of the one at West-Albany, although there are others in operation of a different construction which give good satisfaction. Of these, we may mention the one designed by Mr. W. H. Paige, of the Wason Manufacturing Company, and another by Mr. James B Gregg, of the Erie Railway shops at Susquehanna, both of which are operated by an engine placed upon the table and traveling with it. Few shops, however, except the larger ones where a large quantity of work is done, can afford the expense of an independent engine for this purpose.

The table which is the subject of our notice was designed by Mr. Joseph Jones, the master car-builder of the West-Albany shops. It is 60 feet long, 17 feet 6 inches wide, weighs about 12 tons, and its platform will hold one large passenger-car or two freight-cars. The power for driving it is supplied from an adjoining shop, and operates the table by means of gearing and an endless wire rope. When the table is not in use, the gearing is disconnected, and the rope and moving parts are stationery. It runs upon three tracks or rails—one in the centre of the pit, and one upon each side. There are nine cylindrical wheels 36 inches in diameter, and without flanges; two small horizontal wheels *e e* on each side of the table, and also on each side of the central rail, supplying the place of flanges. and with much less friction. The rails rest upon timbers running the length of the pit, which is 416 feet, and the timbers rest upon a foundation of masonry. Upon the sides of the central rail, castings *f f* are bolted, which carry double-flanged rubber-lined wheels *g g*, in the grooves of which the rope runs, and is thus kept off the ground and prevented from chafing. The problem to be solved was to give motion to the table without an undue strain in starting, and without injury to the rope, and this has been done in a manner which displays a high degree of mechanical ability.

Fig. 1 is a general plan of the table, showing the arrangement of the rope and the relative position of the wheels and working apparatus. A A is an outline of a portion of the table, with the flooring and a part of the upper machinery on one side removed in order to show the operation of the cable; B B B are tracks on which it runs; C C C are the carrying-wheels; D D is the rope or cable, and E E E are the driving-wheels at the end of the pit, with 30 inches diameter at their bearing-surface and receiving power by means of bevel-gear. These wheels have a V-shaped groove *a*, Fig. 3, in their periphery, with a reversed dove-tailed chamber at the bottom to receive the rubber filling *b* on which the rope runs. The filling is made of old car-springs at trifling cost. The shafts, on which these wheels are rigidly secured, are all geared together by spur-wheels F F F, of slightly larger diameter than the rope pulleys, by which means the adhesion of all the wheels to the rope is secured, and the slip of the latter prevented, while the former revolve with uniform velocity. G is an idler or loose pulley around which the endless rope runs freely at the other end of the pit. It is constructed similar to the drivers, and has appliances for tightening the rope, its axis moving in a suitable longitudinal slide. H H H are two sets or trains of pulleys placed on each side of the centre of table, with the rope passing around them as shown in the diagram. They are rigidly secured to upright shafts running in bearings attached to the table, and are also geared together and filled in the same manner as the drivers, for the purpose of securing the aggregate adhesion of the rope. On one of the shafts in each train, and opposite each other, are plain-faced friction-wheels I, securely keyed and furnished with brakes J J. These brakes are actuated by suitable lever connections, their ultimate motion being concentrated in one lever K keyed upon a shaft above the platform or deck. The arrangement of the brakes may be understood by reference to Fig. 5. For the purpose of lifting the cable from the ground-pulleys and conducting it in a horizontal line into the grooves of the rope-wheels H H, suitable pulleys *m m* are provided at each end of the train of drivers. These pulleys have rubber bearing-surfaces about 5 inches in diameter, and are supported on suitable axles. An elevation of one of them is shown in Fig. 2 immediately over the ground-pulley *g*. All the machinery, excepting the hand-lever K, by which the power is applied, is placed beneath the platform or deck.

The operation of the table is as follows: The cable when in use is in continual motion in one direction, freely driving all the wheels, while at the same time the table remains at rest; but when the lever K is pushed over to one side, and the brakes are thereby applied to the friction-wheel on that side of the cable, they will allow it to slip around with constantly decreasing speed until the inertia of the table is gradually overcome, when it will be held firmly, the whole train stopped, and the table will then move along at the same speed and in the same direction as that side of the cable on which the brakes are applied, which result is practically the same as if the rope was made

Fig. 1

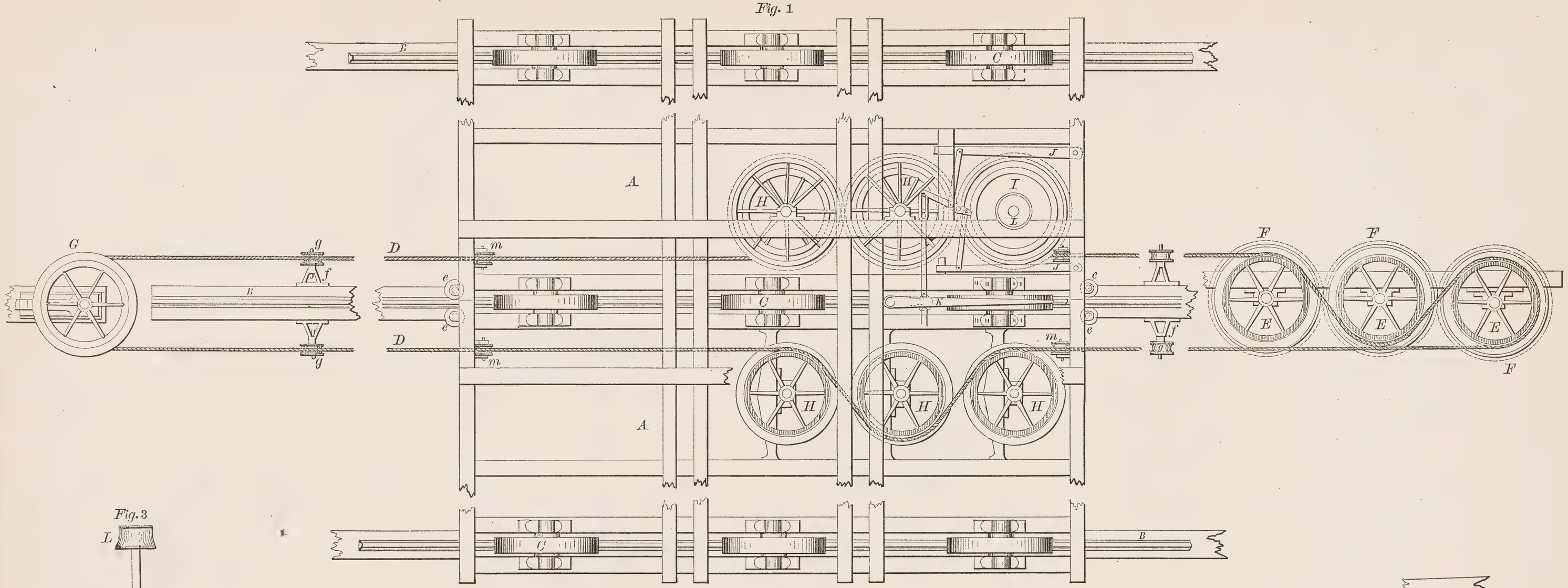
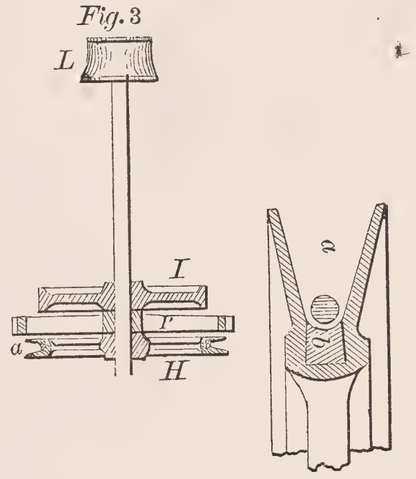


Fig. 3



Scale 1/4 in=foot

Fig. 4

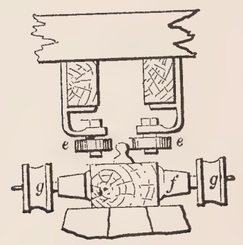
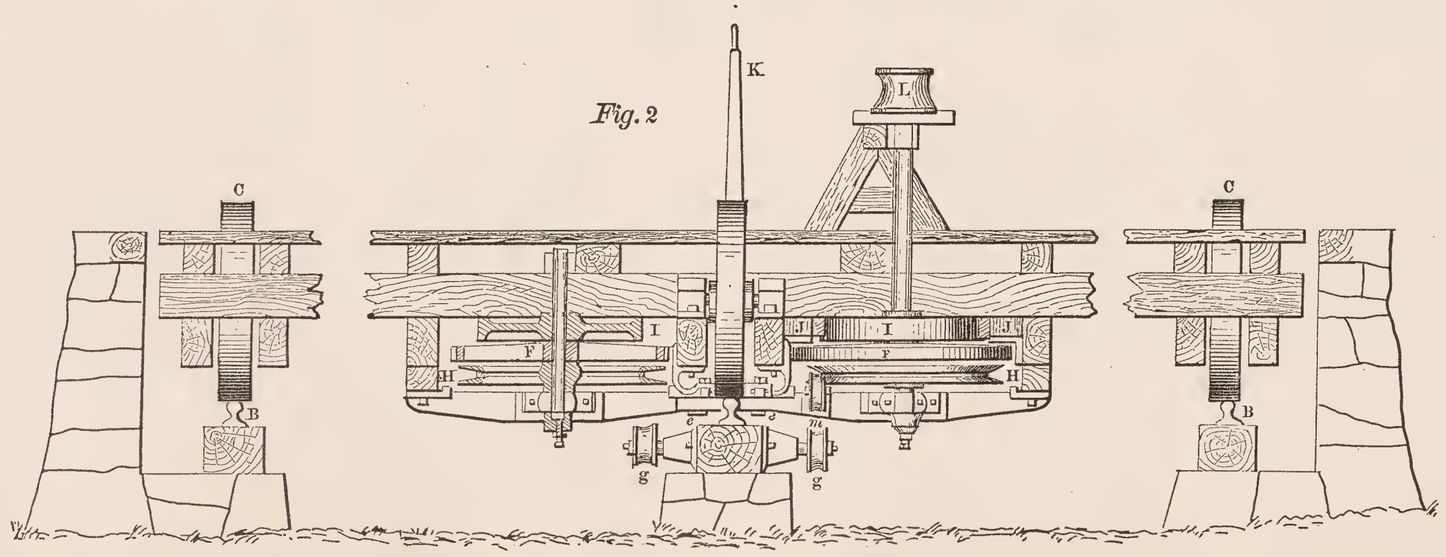
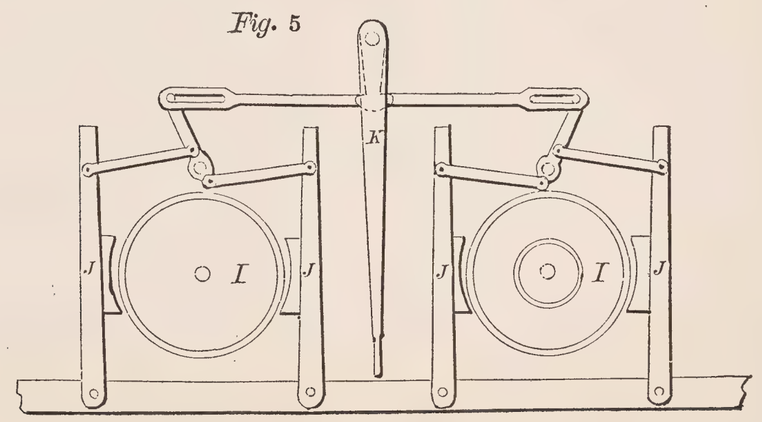


Fig. 2



Front Sectional Elevation

Fig. 5



TRANSFER-TABLE OF THE WEST-ALBANY CAR-SHOPS.

fast to the table. While this is taking place, the train on the other side continues to revolve freely. It is manifest that if these wheels are in turn released, and by the aid of the same lever, the brakes are applied to the train on the opposite side of the cable, the same result will be accomplished, except that the table will obviously move in a contrary direction.

We believe that all the attempts hitherto made, that have come under our observation, in attaching cars or other vehicles to a rope while in motion, have failed simply for the reason that adequate provision has not been made for gradually overcoming the inertia, and allowing the slip to take place at some other point than at the immediate contact between such attachment and the rope.

One of the principal advantages this has over other systems, where the power is not on the carriage or table itself, consists in the facility with which it can be stopped by the operator himself upon the table when opposite the desired point, whereas if the motion is given by a rope winding around a drum at the source of power, or any similar arrangement, the starting and stopping has to be done by signals, by which means it is impossible to stop exactly at the right spot; besides having a powerful capstan always in motion when the table is at rest, makes it still more advantageous. This principle of applying power can doubtless be made available for other purposes than the movement of transfer-tables. The facility with which power can be transmitted by means of the wire-rope to great distances, makes the principle easy of application in cases where it might be inconvenient to employ any other, as the moving of stone in quarries, or heavy merchandise from vessels. The capstan moving with the table, and being in motion when the latter is at rest, heavy and bulky materials can be handled and moved with great facility.

Head-Linings.

EDITOR OF THE NATIONAL CAR-BUILDER:

THERE is perhaps no part of the interior finish of a passenger-car which requires more thorough artistic treatment than the head-linings. This is rendered necessary from their position, and the relation they bear to the rest of the interior. To realize the very great improvement that has been made in this branch of car decoration, we have only to contrast the best head-linings now produced with those which adorned the old-fashioned, flat-roofed, non-ventilated cars in vogue a dozen years ago. The average railway passenger was quite content with the meagre display of cheap mechanical designs in printed colors which passed for head-linings at that time, and which may still be seen on some of the older roads. This kind of work, however, is rapidly being replaced by the modern style of imitation fresco painting, which began to be applied to linings about the time of the adoption of the raised or monitor roof. Although very decided improvements have been made in this style of linings since their first introduction, much inferior work of this class is everywhere to be met with—mere daubs, defective in design and color, and having no proper relation with their surroundings. We have seen cars in which the prevailing color in the head-linings was dark blue, while the wood-work was black-walnut with a dull, dead polish, and the seats upholstered with crimson or bright scarlet. This will do very well perhaps for a circus transparency or the American flag, but such an incongruous, toy-shop mixture of tints is hardly the thing to present to the critical inspection of railway passengers nowadays, many of whom are quite competent to distinguish between what is crude and discordant, and what is harmonious and graceful in the sphere of art.

In most shops where the roads build their own cars, head-linings are also painted, and, as a rule, are creditable to the taste and skill of the workmen. There are also a number of establishments in the country which make a specialty of this kind of work, the quality of it being good, bad, or indifferent according to the inducements offered or patterns selected by customers. We recollect the first attempt made many years ago at the "Pan-Handle" car-shops in Steubenville, Ohio, to manufacture home-made head-linings. These shops had at that time an advantage over their rivals in the art, in the matter of space for the display of canvas on the car roof, the carlines being finished up and placed in pairs so as to make room for nearly a square yard of lining between them. This plan of finishing the roofs, although the effect was very pretty, involved considerable labor and expense, as the carlines had to be smoothed, polished, and moulded on the corners. We believe this method has since been abandoned by that road, and the less troublesome one adopted of extending the canvas from end to end of the car.

We noticed last winter some very beautiful head-linings on a car of the New-York Central and Hudson River Road, the designs being particularly noteworthy. The inside surface of the roof, between the side of the car and the dome-lights, was convex, so that the canvas placed upon it would lie smoothly. The roof was self-supporting, there being no cross-carlines to obstruct the view through the car. The painting was exceedingly well executed, with no trace of contract or machine-work about it, the designs being of the patriotic stripe, and comprising the national coat of arms, with portraits of Washington, Jefferson, and others; while around the lamps and ventilators were wreaths of flowers and clusters of fruit very carefully and elaborately painted. A comparison between this style of work and the old style to which we have referred, presents a contrast almost approaching the ludicrous. A fastidious critic might question the taste of the designer in some minor points, but the artistic excellence of the execution was manifest to the most casual observer. If the majority of the cars on this road are as tastefully decorated as the one we had the good fortune to ride in, they are deserving of special commendation. We do not know where the linings of this class are manufactured, or we would give due credit.

In this connection we would mention that the palace sleeping-coaches of the Lake Shore and Michigan Southern Road, and especially those built at the Cleveland shops, have head-linings which are very superior in design and execution, and are well worthy of imitation. They are not surpassed by any we have ever seen; although they were painted under the disadvantages of poor light, contracted space, and with more or less annoyance from dust. Those made at the shops of the Cleveland and Pittsburg Road, and placed in the new cars turned out last winter, are beautiful specimens of art, and forcibly illustrate the progress that is being made in this branch of car-decoration. They differ materially from the prevailing style, the lines and scrolls being all in light tints, which, in the absence of dark shading, give to the car a light and airy appearance. Copies of popular and well-known pictures are placed in various parts of the car, which serve to occupy the attention and relieve the monotony of traveling. The painter at these shops has a weakness for this kind of thing, as is evident from the head-lights, sand-boxes, and tenders of the locomotives on this road.

The Pullman Palace Car-Company have probably done more than any other organization to improve the style and quality of head-linings, and establish a high standard of excellence, by employing designers of superior skill to furnish patterns that meet the requirements of true art, while at the same time they are sufficiently varied to avoid monotony. It is evident that the more the style and quality of head-linings are studied as an art, the sooner will the art be mastered and understood. A true decorative painter must know what the *effect* of his work will be when seen in its proper position, modified by the lights and shadows of its necessary surroundings. He must see, as it were, the end, from the beginning, as does the true architect who shapes and places every block so its own proper individuality is lost in the perfection and symmetry of the completed structure. A railway-car should be decorated by the same rule. There should be no discord, but, on the contrary, fitness, harmony, and subordination. Too many colors are not unfrequently combined in one lining, with too great a preponderance of the primitive rainbow hues over the subdued and neutral tints, producing an effect analogous to over-dressing or over-acting. The excess of glaring colors is often aggravated by a corresponding excess of elaboration in design and figures, giving the entire performance a meaningless Dolly Varden look, and revealing no intention or purpose in the mind of the artist. Good work can only be produced by those who have in some degree an innate perception of the beautiful, in form, color, and adaptation. The mere undisciplined freaks of a wayward fancy is not art; and the more this fact is realized in every branch of car ornamentation, the sooner will every detail thereof be made to conform to the requirements of good taste.

LORAIN.

Size of Axles.

EDITOR OF THE NATIONAL CAR-BUILDER:

DEAR SIR: I was somewhat surprised at the result of the discussion upon the size of axles and journals at the last monthly meeting of car-builders, as reported in the May number of your paper, and feel quite willing to identify myself with the apparently feeble minority represented by Mr. Varney, of the Fitchburg Railroad, who, I think, can well afford to stand alone, especially if he is not prepared to shoulder that ponderous unmeaning mass of iron, called the Adams axle. The standard axle used upon one of the best roads in the country has the following dimensions: length, 6 feet 11 inches; diameter of wheel-seat, $4\frac{3}{16}$ inches; journal, $6\frac{3}{4}$ x $3\frac{1}{4}$. This size seems to answer every requirement under the heaviest cars; and it seems to me that in view of this demonstrated and well ascertained fact, it would be unwise to adopt a very much larger axle because a few men may guess or imagine it to be better. I have no objection to the axle recommended by the committee, but to exceed the dimensions named would, in my judgment, be not only superfluous, but worse than a waste of material.

The views of Messrs. Adams and Smith in regard to friction are to me quite wonderful, as I have always supposed that the increase of the size of an axle increased its surface measurement, and thereby necessarily increased the friction. For example, we will assume that the circumference or surface measurement of a $3\frac{1}{4}$ journal is $9\frac{3}{4}$, and of a $3\frac{3}{4}$ journal $11\frac{1}{4}$, making a difference or surplus of $1\frac{1}{2}$ inches to pass under the bearing every time the wheel makes a revolution. Now, to maintain that the amount of friction in these two cases is the same, is as irrational as it would be to assert that the larger journal weighs no more than the smaller one. I will only remark in conclusion that if we are ever to realize practically the views of Mr. Blanchard, as set forth in the same number of your paper, in regard to dispensing with surplus material in cars, we shall have to look elsewhere than to the dead issue and dead weight majority of the last monthly meeting.

VETERAN CAR-BUILDER.

Railway Master Mechanics.

THE Baltimore *American*, in an editorial notice of the recent convention in that city, pays the following merited tribute to the character of its members:

"It is worth while to spend an hour in the convention to hear the discussions and see the men. There are a great many fine heads, and there is not a dull-looking face in the whole assembly. The best mechanical talent in the United States, possibly in the whole world, is here. These are the men who design and make our splendid locomotives and railroad-cars, who

spend their days and nights in solving problems in which resistance, and friction, and heat, and the tensile strength of iron and steel, and the expansive power of steam are the factors, and who represent what might be called the upper class of American artisans. If there is a workman in any machine-shop who excels all his colaborers in skill and inventive talent, the railroad men are apt to find him out, and he is pretty certain to become a master railway mechanic. All of these men have worked their way up from the anvil. Some of them have evidently retired from the glowing heats of the forge, and are now more accustomed to use the draftsman's pencil than the hammer, but others wear in their faces the scars of the workshop.

"It is surprising how well they talk. These master mechanics do not pretend to be fine speakers, but, unlike many aspiring orators, they know what they are talking about. They have studied the subjects which they discuss, and tested theories by practical experience. When they advance an opinion they always fortify it with a fact, or probably a series of facts, drawn from their own observation. Their opinions and conclusions are of great interest to the general public.

"We all ride in railroad-cars, and have a lively, personal interest in the construction of locomotive boilers that will not burst, and driving-wheels that will not leave the track, and brakes that will quickly stop a train. For the speed and comfort with which we travel, and the comparative immunity from danger which we enjoy while rolling luxuriously along at the rate of thirty or forty miles an hour, we are indebted to these quiet, patient, laborious, modest master mechanics.

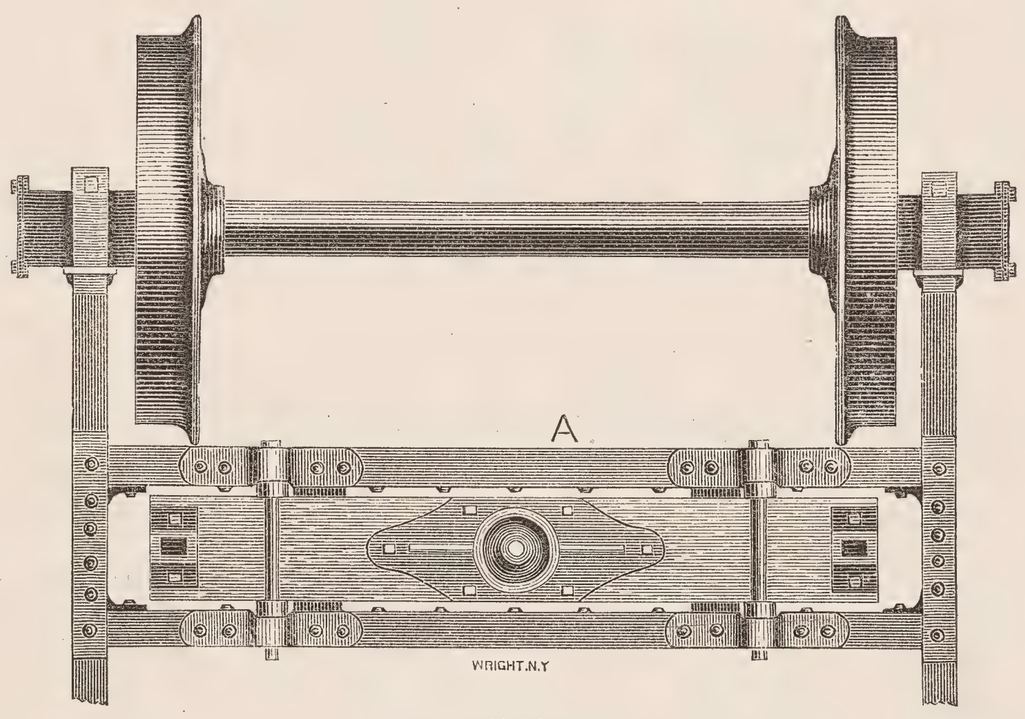
"They have met to compare views and plans, and to bring their united skill and judgment to bear upon difficult problems. We doubt not but that the traveling community will be largely benefited by their deliberations. We should welcome them as representatives of the most extended, the most useful, the most splendid, and the most progressive mechanical industry of the age, and as benefactors of their race, who are laboring and thinking and planning, day and night, for our comfort and safety."

A New Car-Stove.

A NEW device for heating passenger-cars consists of a stove hung partly under the car, and supplied with pipes that pass round the fire-box, and then out under the car. The ends are open and trumpet-shaped, so that the motion of the car causes a powerful draught to enter them. The stream of air passing through the pipes is heated on passing several times round the fire-box, and enters the car through suitable wire-covered openings. It is claimed that fresh air, warmed and free from dust by this means, is supplied in abundant quantities. Suitable dampers govern the flow of air, and branches and cut-offs are so arranged that as the motion of the car is reversed the current enters another set of mouth-pieces. The device includes a stove, having openings and dampers, to admit air for combustion from the outside, whereby a good draught for burning coal is obtained. This is not essential, but the application of the current of warmed air from the outside admits of varied application to our present defective system of car-heating.

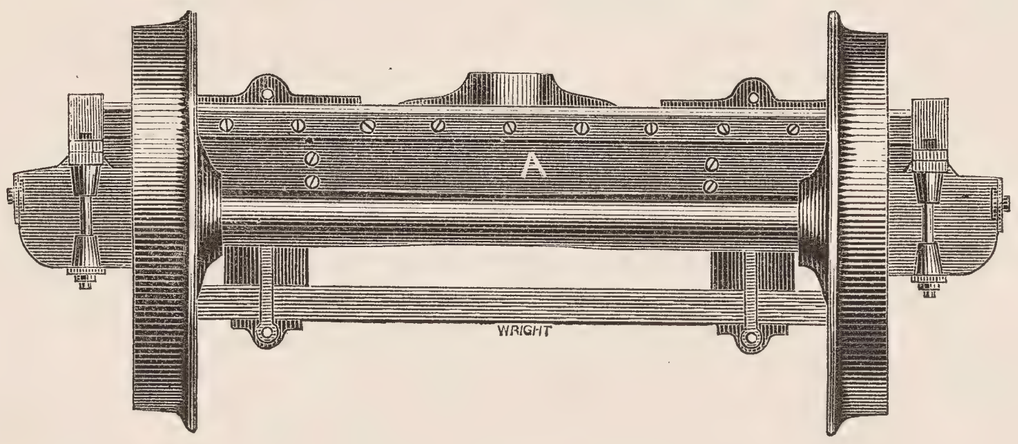
Improved Iron Freight-Car Truck.

THE engravings represent a plan, and side and end elevations, of an improved iron truck for freight-cars, which has been used on the Burlington and Missouri River Railroad for several years past. The improvement consists in the substitution of iron cross-pieces on each side of the bolster, instead of wood, which give greater strength and durability to the frame, while the first cost does not exceed that of the standard trucks used on many leading roads. These cross-pieces A A are made of one-quarter inch boiler-iron, the ends being firmly riveted to the side-trusses, and also to a cast-iron end-piece, as shown in the cut They are also stiffened by angle-irons riveted to the top and bottom, which prevents any lateral yielding, and adds to the strength of the whole. Instead of boiler-iron with the angle-iron strips at the top and bottom, channel iron, rolled for this purpose, can be used. The engravings show the details of construction so clearly that but little description is necessary. We will state, however, that instead of a bolt to connect the truss-irons with the jaw-brace on the inner side of the journal-box, a strap or yoke is used, the two ends of which are bolted to a flat strap underneath. This is not shown in the cuts. We also add that an axle and pair of wheels can be taken out when necessary by driving a block under the truss by the journal-box, and loosening three nuts on each side.



PLAN.

SIDE ELEVATION.



END ELEVATION.

So far as we know, this is the only freight-truck constructed on this principle, in use in the country. The practical test which has been made of it on the above-named road would seem to leave no question as to its essential utility. Its advantages are obvious in view of the difficulty of obtaining good hardwood in some sections of the country, especially at the South; and it is also represented by competent railway mechanics as being superior to any ordinary car-truck which has its framing mainly of wood. The Burlington and Missouri River Road has recently been consolidated with the Chicago, Burlington and Quincy and no longer exists under its former name.

Poking Fun at a Railroad.

AND then, another occasion, I remember, we came within a hair's-breadth of having a very serious accident. The engineer had got off to snowball a chip-munk, and the conductor was minding a young widow's baby. The result was the train happened to get on a down-grade, and was started off at a terrible rate, every bit of four miles an hour, I should think. We were just half a mile above the Annapolis Junction, and the first thing we knew—there being no one to whistle and wake up the switch-tender—we were turned off into the Annapolis road and went down the wrong track at full speed. Imagine our consternation when just at this moment we heard the whistle, not half a mile ahead of us, of the Annapolis up-train. We were paralyzed with terror. Here were two trains on the same track, approaching each other at the headlong speed just mentioned. Evidently our time had come. In a few short hours the engines would meet, and then—destruction.

With great presence of mind a minister on board organized a prayer-meeting. Pale but calm, the doomed band of passengers sat, and though with the very shadow of death upon them, raised their voices in a parting hymn.

"Send for the baggage-master," said a young man with a sad smile.

"For what reason?" was asked.

"Because we are about to pass in our checks."

Every body wept. From the rear platform we could see the miserable engineer straining every nerve to catch up, but he had tight boots on, and didn't gain any thing to speak of.

At this moment a ray of hope dawned upon us. I had just finished writing my will on the back of a visiting-card, when I observed a young lady in the act of detaching her bustle. Placing the article—which was composed of eight hundred papers and a hair mattress—under her arm, the heroine marched through the car, climbed up on the tender, and then over the engine. It was very interesting to see her climb over the wheels and brass things on her way to the cow-catcher. Holding on by the cross-bars with one hand, the noble maid tied the bustle on the sharp prow with the other.

You can guess the result. In the course of the afternoon the collision came off. Protected by the bustle, the engine received a gentle bump, and we were saved. I took up a collection for the woman on the train. I always take up a collection on such occasions—always. And what's more, I never forget to give the object interested something nice out of it—never. There is nothing mean about me. I suppose you have noticed my clothes.—*Exchange.*

Miscellaneous Items.

On the 18th of last month, the large paint-shop, wood-working shop, carpenter-shop, and car blacksmith-shop of the Chicago, Burlington, and Quincy Railroad, at Aurora, Illinois, were destroyed by fire. The buildings were of wood and filled with the best machinery. In the paint-shop two new Pullman cars were destroyed, and another one outside which was not standing upon trucks; also five passenger-cars, three new freight and two mail-cars are also reported to have been destroyed. The machinery was very valuable, but the greatest loss doubtless was the large amount of valuable seasoned lumber destroyed. The fire-proof buildings, including the round-house, the larger blacksmith-shop and the foundry, were not burned. The fire has not affected the business of the company in the least, and it is the intention of the officers to reconstruct the buildings as soon as possible in a more permanent form. The property destroyed was worth about $250,000, which is fully covered by insurance.

A Wilmington, N. C., paper speaks of the works of the Cape Fear Building Company, at Abbottsburg, on the line of the Wilmington, Charlotte, and Rutherford Railroad, as doing a very thriving business in the way of transforming the surrounding pine forest into lumber and building material. The logs go into one end of the factory and come out at the other end a house ready to live in. Fifty freight-cars for the above-named road were built here in two weeks, and arrangements are being made to increase the capacity of the works so as to turn out five cars a day, in addition to the usual quantity of flooring, laths, blinds, mouldings, house-frames, etc. Abbottsburg is fifty miles from Wilmington, and eight years ago was an unbroken wilderness.

The machine and car-shops of the Indianapolis, Peru, and Chicago Railroad, at Peru, Indiana, have recently been constructe l under the direction of Mr. John McKenna, the master mechanic of the road. The round-house is still in complete, and when finished will contain 30 stalls. The machine-shop is 150x110, the car-shop 70x52, the blacksmith-shop 100x52, the boiler-shop 42x36, and the engine and boiler-house 32x22. The latter is fire-proof. The present car-shop is located so as to be changed into a machine-shop when the increase of business requires it, and a new one erected in the place reserved in the plans. The buildings are of brick and are one story high, except the car-shop, which is two stories. The general plan of the works is considered a very complete one, and is the result of a careful examination of similar shops in various parts of the country. The future and permanent car-erecting shop will be in the form of a semi-circle, with tracks converging to a central turn-table.

The car-wheel works of Bowler, Mayer & Brayton, at Cleveland, Ohio, have been established ten years, and at present employ about 80 men. From 20 to 25 tons of metal are used daily in the manufacture of car-wheels and all kinds of castings for railroads and rolling-mills. The iron is mostly from Lake Superior ore, melted with soft coal at the Mahoning Valley furnaces. Many of the roads running into Cleveland are supplied from these works, and the wheels made here are to be found upon numerous Western roads.

The proprietors of the Quealy Car and Iron Works, at Hannibal, Mo., have sold their establishment to a stock company under the name of "Hannibal Car Works," of which Josiah Hunt is President, and H. C. Whiting, General Manager. The works now turn out five freight-cars per day, but it is the intention of the new proprietors, who have abundant capital, to increase their capacity by the erection of additional shops with facilites for the manufacture of passenger-cars. The location is a favorable one as respects timber and iron, and under the supervision of the officers above named, who are identified with railway progress at the West, the new works will be able to compete with any similar establishment in the country for the building of cars for Western roads.

The shops of the Central Pacific Railroad at Sacramento employ upward of 1,200 men, with a pay-roll of $1,000,000 or more per annum. The amount of stock consumed exceeds in value $2,500,000 a year. There are used 7,000,000 feet of lumber, 3,000,000 pounds of cast, and 3,500,000 pounds of wrought iron. Of this large expenditure 58 per cent is for repairs. In 1872, there were manufactured 630 box freight-cars, 200 flats, 32 caboose-cars, 15 fruit-cars, 25 dump-cars, 4 water-cars, 3 oil-cars, 2 U. S. postal-cars, 45 hand-cars, 25 section-cars, 1 directors' car.

It is estimated that the number of railroad ties in present use in the United States are 150,000,000. A cut of 200 ties to the acre is above rather than under the average, and it therefore has required the product of 750,000 acres of well-timbered land to furnish the supply. Railroad ties last about five years; consequently, 30,000,000 ties are used annually for repairs, taking the timber from 150,000 acres. The manufacture of rolling stock disposes of the entire yield of 350,000 acres, and a full supply of 500,000 acres more every year. It appears, then, that our railroads are stripping the country at the rate of 1,000,000 acres per annum, and their demands are rapidly increasing.

Railroad men and iron dealers can ascertain the number of tons of rails to a mile by a simple calculation. By multiplying the weight of the rail per yard by 11, and dividing by 7, the correct number of tons required to lay one mile of track is correctly and quickly secured. As an example, take a rail weighing 30 pounds per yard: 30x11=330; divided by 7= 47$\frac{1}{7}$ tons. The rule holds good for iron of any weight, and is one of those singular mathematical workings which puzzle us to know how they were ever discovered.

A ten-wheel engine is being built for the Denver and Rio Grande Railroad at the Baldwin Locomotive-Works, and another, a Fairlie "double header," in England, built with two boilers, placed "starn to starn," and consequently always runs forward, the cab and engineer being in the middle and between the boilers. The company are also building at their shops two baggage-cars, each thirty-six feet long by eight feet wide, being ten feet longer and one foot wider than those now in use.

A map of the Northern Pacific Railroad, measuring 42 feet by 10, and representing an area of 655,200 square miles, is to be sent to the Vienna Exhibition. It is executed in water colors, and shows at a glance the contour and general physical characteristics of the whole immense stretch of the country. It was only five weeks in preparation.

An indication of the enormous growth of railroad traffic is found in the fact that at present there is actually a car-famine, the leading roads finding it impossible to get their orders for freight-cars filled at the overcrowded factories. The Buffalo *Courier* says the Lake Shore and Michigan Southern have given contracts for three thousand additional cars, while the New-York Central is anxiously awaiting a reinforcement of fifteen hundred. The Buffalo, New-York, and Philadelphia road also wants three hundred in addition to its present stock, and will need still more before the season ends.

Mr. Abram Reese, of the firm of Reese & Bissell, of Pittsburg, has recently invented a self-extinguishing car-stove, which to all appearances will serve the purpose above indicated. Upon the top of the ordinary stove the inventor places a reservoir capable of holding five to ten gallons of water. In the bottom of the reservoir is a valve operated by a lever at the top. From the end of the lever a cord runs to the top, sides, and bottom of the car. The slightest disturbance of the timbers of the cars, such as a collision would cause, will part the cord, drop the end of the lever, open the valve and empty the water into the stove instantaneously.

The manufacture of rails by a new system, which does away with manual labor to a great extent, is to be carried on in a rail-mill which is now being erected at Louisville, Ky., at a cost of half a million of dollars. In the process of making the rail the iron passes through thirteen sets of rolls without a halt, and is turned over five times for side-rolling. The iron is taken from the heating furnace, and is transformed into a rail in half a minute.

The Nashua, Acton, and Boston Railroad, running from Nashua, N. H., to Acton, Mass., is nearly completed. The passenger-cars are painted outside in brilliant carmine and are very attractive. The track should be well fenced against cattle, to protect the trains from irate bulls.

The New-York and New-Haven Railroad Company have received since the first of January four thousand tons of steel rails, which have been distributed along the road and will be laid during the spring. When these are laid there will be an unbroken double track of steel rails from New-York to New-Haven.

A paper car-wheel manufactory is to be established at Hudson, N. Y. The machine-works of R. H. Mitchell & Co. have been secured, with adjacent property, for the location of the new works. R. N. Allen & Co., of Brandon, Vermont, are the patentees of the paper wheel, the peculiar construction of which has already been described in these columns.

Seventy-five new engines have been ordered at the Pennsylvania Railroads shops at Altoona, for the use of the road. They are to be finished by the close of the year 1873. That road now has, it is said, 811 locomotives running.

The Wason Car Company, Springfield, have received a contract from the New-York, New-Haven, and Hartford Railroad to furnish them with fifty-five platform cars. This order is due to the increasing freight business of this company, which has reached to such an extent that they have been obliged to borrow cars from other companies.

The Westinghouse Pneumatic Car-Brake has just been fitted upon a complete train of the London Underground Railway, (Metropolitan District Railway,) and operates with admirable efficiency. The locomotive superintendent, Mr. Speck, states that it is the best brake ever used on that line, and will pay its first cost within a year.

The Boston and Maine Railroad car-shops, at Lawrence, Mass., are turning out some elegant parlor-cars, which are to be used on the main line of that road, besides eighteen fine passenger-cars.

The Eastern Railroad will erect this season a magnificient freight depot in Salem, three hundred feet long, with a platform on each end one hundred feet long.

The Boston and Albany Railroad have in contemplation the running of Wagner's palace drawing-room cars from Boston to Rochester, N. Y., without change, It is intended that they shall be attached to the morning and afternoon trains. Two of these cars are now nearly ready.

New car-works are to be constructed at Oxford Chester County, Pa., on the line of the Philadelphia and Baltimore Central Railroad, fifty-two miles from the former city. They will be brick and frame, and will be completed during the coming summer.

It is estimated that the Pennsylvania Railroad Company will disburse $19,000,000 in this State during the present year in laying an additional double track between Pittsburg and Philadelphia, grading for which has already commenced, and in making other improvements. Of this amount $3,000,000 will be expended on the Pittsburg division, extending as far east as Altoona, a distance of 117 miles.

GROUND has been broken for the new car-works at Swissvale, near Pittsburg. The buildings will consist of a machine shop 200x75, two erecting shops 220x75, a blacksmith shop 150x50, and an engine house 24x45.

HEMP, cut when it is in bloom, quickly dried in the shade, and kept free from moisture, is said to be an effective remedy against moths in car-seat cushions.

THE Chesapeake and Ohio Railroad Company have doubled their number of freight-cars and added seventy new engines to their road, without being able to carry all the freight offered. The company have also purchased seventy acres of land at Huntington, on the Ohio River, where car and locomotive shops are to be erected.

MR. J. H. DEVEREAUX has resigned the position of general manager of the Lake Shore and Michigan Southern Railway, and has been elected president of the Cleveland, Columbus, Cincinnati, and Indianapolis Railroad Company, in place of H. B. Hurlbut, the previous incumbent, who has been chosen vice-president.

THE Litchfield car-shops are turning out a large number of new box-cars for various roads; and among them St. Louis, Alton, and Terre Haute cars for the Belleville and Southern Illinois division.

COLONEL ANDERSON, late Superintendent of the Illinois Division of the Toledo, Wabash, and Western road, was recently presented by the employees of the road with a handsome watch and chain and an elegant silver service.

A HARTFORD paper calls attention to a new railway car-brake invented by Mr. William Kimball, of Woburn, Mass. It is thus described:

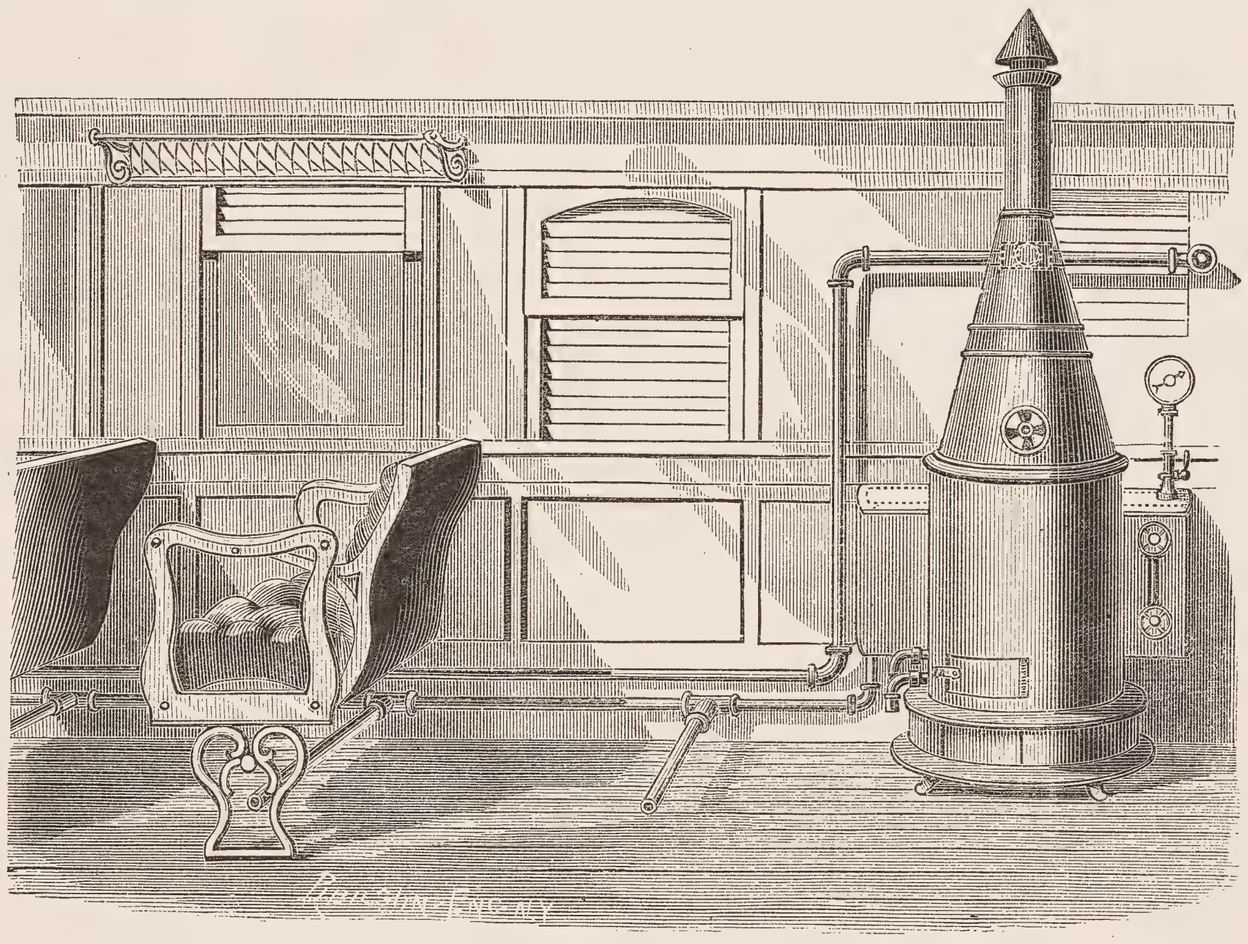
"This is the adaptation of the most simple and effective of the mechanical powers, the screw. A shaft of wrought-iron is placed under the entire length of the car, and with this, placed opposite the brake to each wheel, a screw is connected by an endless chain. A brake-wheel on the platform, revolving vertically, enables the brakemen to bring an immense power to bear instantly, and, by a gentle movement, causing no jerk; arresting the rotary motion of the wheels, it is claimed, before they can make two revolutions. The same brake is said to be equally applicable to the driving-wheels of a locomotive, putting it in the power of the engineer, in a sudden emergency, to shut off steam with one hand and apply the brake with the other. It is made entirely of wrought iron; is very simple in construction, inexpensive, not liable to get out of repair, speedy, sure, and effective in working; such are the advantages claimed for this new brake."

Fruit-Cars.

A CORRESPONDENT of the *Railroad Gazette* communicates the following in regard to the fruit trade of California, and cars built at the Sacramento shops of the Central Pacific Railroad for transporting fruit to market:

"As a sort of attendum to the car department, something may be said of the company's refrigerating fruit-cars, which are probably peculiar to California. From a very humble beginning, the transportation of fruit eastward has become a business of magnitude, one farmer alone, C. F. Reed, of Knight's Landing, Yolo County, having sent last season, according to my recollection, over thirty car-loads of green fruit, some of it even as far as Liverpool. In 1872, there were orwarded from California by rail 3,112,749 pounds of green fruit, of which 1,081,985 pounds went to the States, while the remainder halted along the Territories, etc. So rapidly is the business increasing, that fifteen new cars were turned out of the company's shops last year to accommodate it.

"The best success has attended the use of a patent called Booth's refrigerating car, which is constructed as follows: There is an inner or false ceiling, wall, and floor all round the car, and at each end of it a compartment three feet wide, in which to carry sacks of pounded ice and salt. Inside the car are placed twelve galvanized iron tanks a foot wide, reaching from the floor to the ceiling, which contain ice and rock salt. At the bottom and connecting with each tank is an iron pipe to carry off the water from the ice, and provided with a gooseneck to prevent the air from entering the car. In the roof are two fans, which are worked by the wind caused by the motion of the car, communicated through two duplicate fans outside. The heated air in the car rises, and is propelled by the fans down through the ice-chambers, where it is cooled. The gases exhaling from fruit are also carried through these chambers, where they condense and adhere to the sides in the shape of frost, which is scraped off by a man attending the car. By this means an equable and cool temperature is maintained in the car all the while."



STEAM HEATER FOR RAILWAY CARS.

Steam Heater for Railway Cars.

THE engraving represents an improved steam heater, of which George B. Riggins and Andrew Van Horne are the inventors, the patent being now owned and used by the New-York Steam Heater Company, of which the above-named gentlemen are directors. The apparatus consists of a water-tank holding about twenty-five gallons, from which water is supplied to two coils of pipe inclosed in a heating furnace. These coils are united at the top of the heating-chamber, and the steam generated within them passes directly into a one-inch pipe extending along the sides of the car, under the seats and next the truss-plank, and returning again to the supply-tank, as shown in the cut. The lower or returning portion of the pipe is inclosed in a one and one quarter inch outer tube or heating-jacket, through which the condensed steam passes back to the supply-tank and is discharged through a pipe reaching above the water-level, the force being partly steam-pressure and partly the suction of a partial vacuum formed in the tank as the water flows into the generating coils—thus keeping up a continuous circulation. Branch pipes or radiators, one half-inch diameter, extend from the lower or return pipe under each seat, as shown; these also being inclosed in a jacket, but open at the ends next the car aisle, so that steam is constantly discharged at these ends and circulates between the inner pipes and jacket, diffusing a uniform and agreeable heat through the car. The water level of the tank is about twenty-six inches from the floor. Little replenishing is required, the supply being kept up by the condensed steam. The side of the car opposite the heater is warmed by a separate set of pipes passing across the end under the door-sill.

The experimental operation of this device may be seen at the works of the New-York Steam Heater Company, 431 and 433 East Tenth Street, in this city. The apparatus, including twenty-three seat or branch radiators, is placed in a room 42x40, and about 10 feet 6 inches high, and containing a volume of air equal to that contained in three fifty-foot cars. The furnace is seventeen inches in diameter and five inches deep. The result of the experiment witnessed by us a few days since was as follows. The temperature of the room standing at 65°, fire was lighted in the furnace of the generator. In eighteen minutes the end of the branch radiator under the seat next the heater was quite warm—those furthest from the heater being warmed first by the steam in making its circuit. In twenty-eight minutes the temperature of the room was considerably higher; in forty-two minutes it reached 80°, and in an hour from the time the fire was started it stood at 84°, at which point it remained during the test. In forty-five minutes the pipes were so free from water that steam blew off gently from the tank, showing an easy circulation with but little pressure. The quantity of fuel used was three bundles of kindling-wood and the grate full of coal.

An important and economical feature of this invention consists in the steam-pipes being below the water-level of the supply-tank, so that steam and fuel are utilized to the utmost. The apparatus will soon be practically tested on a Pullman drawing-room car. It is simple in its construction, easily managed, and not liable to get out of order; takes up no more room than an ordinary stove, is perfectly safe against explosion, and when once started can be run for an indefinite period. With the exception of two check-valves regulating the passage of the water from the tank to the generating coils, there are no valves or cocks to be frozen or rusted. The facility with which a car can be warmed is indicated by the result of the trial test above given.

Any further information in regard to it may be obtained by addressing or applying to the New-York Steam Heater Company, as above, or to William M. Hoes, Secretary of the company, 287 Broadway.

RICHARDSON MERIAM & CO., Worcester, Mass., manufacturers of wood-working machinery, are building a Daniels planer, 115 feet long, for parties in Milwaukee, calculated to plane stock sixty feet long and four feet wide. They recently sent two to the San Francisco navy-yard, one of them 135 feet long, to plane stock 70x3½ feet.

IT is said, in illustration of the great velocity of the winds in Wyoming Territory, that a gentleman in Cheyenne, losing his hat in the street, rushed to the telegraph office, and telegraphed to Denver, Col., requesting that his hat might be stopped there, but was immediately informed that it had gone by, traveling southward.

The National Car-Builder,

PUBLISHED MONTHLY,

BY

VOSE, DINSMORE & CO.,

32 Warren Street, New-York; 52 Fifth Avenue, Chicago; 720 North Second Street, St. Louis.

JAMES GILLET, EDITOR.

Terms, One Dollar per Annum.

JUNE, 1873.

Editorial Announcements.

Correspondence.—*We cordially invite the coöperation of the railroad public in affording us the material for a good mechanical paper. Articles relating to rolling-stock and machinery, by those practically acquainted with those subjects, will be gratefully received. All communications must be addressed to Vose, Dinsmore & Co., No. 32 Warren Street.*

The name and address of the writer must accompany all communications designed for publication.

Advertising Rates.—*For one square, or one fifth of a column, $5 per month, or $50 a year. For half a square, $3 per month, or $25 a year. Larger advertisements by special contract.*

All communications in regard to advertising should be addressed to L. F. Dinsmore, *Post-Office Box* 4055, *New-York City, who is our agent for advertising, and authorized to make contracts, collections, etc.*

Engravings and Illustrations.

We would invite the attention of Master Car-Builders and others to the advantages to be derived from publishing in The National Car-Builder *engravings designed to illustrate the various features and details of car construction, and especially such improvements as can not otherwise be clearly presented. We will procure cuts to be made in the best manner from drawings or models that may be sent us, and charge only for the cost of engraving, inserting the same in our paper with suitable descriptive details, without charge.*

Lubrication.

There are many kinds of lubricants—oleaginous, mucilaginous, saponaceous, and other varieties—each of which is good in its place; but for general purposes and for practical utility, there is nothing that prevents friction so effectually as a judicious application of the well-known, conventional "greenback"—as it were. This kind of lubrication being a moral, social, and business necessity, The Car-Builder, like every other worthy and well-directed enterprise, must needs have its due proportion in order that the machine may run smoothly, without injurious wear and tear of the joints and sockets.

We have been, and are still, sending our paper to a large number of subscribers and readers who have omitted to contribute their mite in the way indicated; or, in other words—speaking financially—who have not paid us the subscription price for the current year; and many are in arrears for 1872. The price, it will be recollected, is one dollar per annum since January, 1873, and fifty cents for previous years. These individual dues are so small that we have not thought it worth while to render formal bills, trusting our readers would make remittances once a year or so. For a monthly periodical of the size of The Car-Builder, containing as much special information, and as well printed and illustrated, a dollar a year is certainly little enough to satisfy the most fastidious, and for the payment of which the reader gets as much of an equivalent as he does for a dollar's worth of ferriage or stage fare, and we think, as a general rule, rather more. It is a small item for each individual reader, but in the aggregate it lubricates the machine; and unlike the general run of steel and iron mechanism, the more such a machine as The Car-Builder is lubricated, the better it necessarily becomes, and the more insignificant the nominal price of subscription, as compared with the intrinsic value of what it buys.

We do not like to subject the list of names on our subscription book to any discontinuing or weeding-out process for the mere non-payment of subscription, because it would hurt the appearance of the book, and impair our faith in the moral fitness of things. We have resolved not to do it; and we know our readers will encourage us in our resolution by prompt remittances for 1872 and 1873.

To Master Car-Builders.

The following circular has been sent by the secretary of the Association to all master car-builders, so far as their names and address could be ascertained. We now print it for the benefit of such as may not already have received it, although the interval is short before the meeting of the convention.

CIRCULAR.

The Master Car-Builders' Association will convene for their seventh annual session, at Boston, on Wednesday, June 11th proximo. The increasing interest in the subjects upon which committees are expected to report gives assurance that the present meeting will prove more important and interesting than any which have preceded it. You are earnestly requested to be present and participate in its discussions and deliberations.

The committee of arrangements have selected the American House as the headquarters of the association, and Meionaon Hall as the place for the meeting of the convention. Delegates are requested to address the chairman of the committee, W. E. Chamberlain, of the Boston and Albany Railroad, at Allston, Mass., and state if they will be accompanied by ladies, so that rooms can be reserved for them.

Leander Garey, Secretary.

May 13th, 1873.

We have reason to anticipate a full attendance, much larger than that of last year at St. Louis, which was comparatively small, owing to causes which do not now exist, namely, the simultaneous meeting of the master mechanics, and the opening of the great musical jubilee in Boston. An effort will be made to have the proceedings more fully reported than they have been heretofore, in view of the importance of the topics to be acted upon, and the increased interest in the deliberations of the convention which is manifest in railway circles.

Master Mechanics' Convention.

We give in our present issue as full a report of the proceedings of the Master Mechanics' Association, at Baltimore, as our space will permit; and although a mere summary, it affords a very good idea of the business done and the range of topics discussed. The attendance was larger than usual, and numerous additions were made to the list of membership. This, in connection with the general harmony and good feeling which characterized the deliberations, is a gratifying evidence of the growing importance of the organization, and the increasing interest which is felt in its aims and purposes. A number of interesting and valuable reports were made by committees appointed at previous meetings to take charge of special subjects; the information embodied being the result of inquiry and investigation during the interval. We regret our inability to print these reports in full, but shall at an early day give such portions of them as we can make room for.

The members of the convention were the recipients of much attention from the Baltimoreans during their stay in that city. An excursion by steamer was made to Annapolis, with ample provision in the way of refreshments and music to render the trip enjoyable. The famous Mount Clare shops of the Batimore and Ohio Railroad were also visited, and an excursion made to Washington in a special train provided by the road. After the adjournment, the delegates came in a body to this city, where they partook of a banquet at the St. Nicholas Hotel, tendered them by a number of merchants and manufacturers interested in railway progress.

The following is a list of the contributors to the New-York reception:

Ramapo Wheel Works, Loco-Engine Safety Truck Co., S. T. Baker & Co., Post & Kalkman, Standard Steel Works, Aaron French & Co., D. A. Stevens & Co., Taylor Iron Works, Moore Car Wheel Co., Nathan & Dreyfus, Vose, Dinsmore & Co., Schenectady Locomotive Works, Brooks Locomotive Works, Grant Locomotive Works, Danforth Locomotive and Machine Works, Rogers Locomotive and Machine Works, Hussey, Wells & Co., L. G. Tillotson & Co., N. & A. Middleton, Thomas Prosser & Son, John R Thompson, Chrome Steel Works, W. Gregory & Co., B. Atha & Co., New-York Steam Engine Co., George F. Blake & Co., William C. Allison & Sons, Valentine & Co., Charles Congreve & Son, Walton Brothers, New-England Car-Spring Co., Union Car-Spring Co., McNairy, Claflen & Co., Baker, Smith & Co., E. Miller, William G. Ulery, Manhattan Oil Co., Goddard & French, Murphy & Co., H. A. Rogers & Co., Buffalo Steam Gauge Co., New-York Belting & Packing Co., Vibbard, Foote & Co., Knowles Steam Pump Works, John Crerar, Providence Tool Co., Lewis Oliver & Phillips, Reading Bolt and Nut Works, William H. Haskell & Co., R. Dudgeon & Co., Morris Tasker & Co., Hendricks Brothers, John C. Wyman, Vacuum Brake Co., Sligo Iron Works, G. W. Richardson & Co., New-Haven Copper Co.

The next annual meeting of the association will be held in Chicago.

Railway Association of America.

The attendance at the meeting of this association in this city, on the 13th and 14th of last month, was not as large as it should have been. The proceedings were opened by an interesting address by the President, Hon. Thomas Allen. Reports were presented on the following subjects, namely, the interchange of cars, train dispatching, a uniform system of national time for time-tables, on postal-cars, and on the gauge of compromise cars. In regard to the last-named subject, the committee recommend that the distance between the points of compromise car-wheel flanges which come in contact with the sides of the rail-heads, should be 4 feet 8¼ inches on the standard gauge track. Some definite recommendations were made in regard to interchange of cars, but as they did not meet the approval of the members present, the subject was referred to a new committee. No definite or final action was taken upon any subject except the gauge of compromise cars, as above. Reports were called for upon heating and lighting cars, uniformity of locomotive reports, and a national railway telegraph company, but none were in readiness. A deputation of the Brotherhood of Locomotive Engineers was received, and an address was made by Mr. Charles Wilson, grand chief-engineer, explanatory of the connection of the organization with the recent strike of engineers in Missouri. The association will meet again in Chicago on the eighth of October next.

A recent report of the Lake Shore and Michigan Southern Railway states that the average rate per mile, in 1872, on all passenger business was 2.59 cents, against 2.79 in 1871. These figures thoroughly disprove the assertion, so frequently and so falsely made, that railroad companies make extortionate rates for their own benefit, and against the public interest; and they establish the fact that the policy of this company has been to steadily reduce the rates, as rapidly as could be safely done consistently with the maintenance of the property in good condition; and this has been accomplished, notwithstanding the very considerable increase of taxation in the six States through which the road runs.

It has become evident that low rates must prevail,

and that a trunk line like this must depend for its prosperity upon the increase of the volume of its traffic, moved on double track steel rails at a moderate rate of speed.

Narrow-Gauge Roads.

THE narrow gauge roads which have been actually built in this country are as follows:

Name.	*Miles.*
Denver and Rio Grande	156
Arkansas Central	48
Iowa Eastern	20
Utah Northern	33
Cairo and St. Louis	27
Central Valley	12
American Fork (Utah)	18
Painsville and Youngstown	12
North and South of Georgia	20
Kansas Central	56
Colorado Central	24
Tuskegee	5½
Lousville, Harrod's Creek, and Westport	5
Ripley	25½
Montrose	22½
Total	484½

The gauge of all the above roads is three feet. There is also a very short road of three feet gauge at Akron, Ohio; a city passenger road of the same gauge in St. Louis, and one in Cincinnati.

VOSE, DINSMORE & CO. are agents for the sale of Cobb's Patent Elliptic Steel Springs, the best device yet discovered for giving to a car-seat that agreeable spring and elasticity so desirable for the comfort of travelers.

The same firm are also agents for the sale of Tonner's Patent Lubricator, manufactured by the St. Louis Tripoli Company. It is very effective for cooling hot journals.

FRENCH WALNUT VENEERS, MARQUETERIE, ETC.—Mr. L. Hirsch, importer and dealer in French veneers, 175 Canal street, has recently returned from Europe with a choice and carefully selected stock of veneering, comprising twenty thousand sheets of superior quality and figure, which he is offering at very low prices. He has also a large assortment of inlaid border-strips cut in suitable lengths, and a variety of new and original designs in marqueterie, all of which has been selected with special reference to the wants of car-builders. Mr. Hirsch makes a specialty of this class of fancy woods, and is prepared to offer superior inducements to buyers. For the interior finish of Pullman palace coaches and the better class of passenger-cars, his present stock is well worthy of inspection. His advertisement will be found on fourth page of cover.

A TROY paper says that a wonderful invention, designed to take the place of the ordinary oil-box on railroad-cars, is being tried on a drawing-room car running between New-York and Poughkeepsie. The plan has been in use on the Lehigh Valley Road for eight months, and when the box containing the oil was opened, it was found to be nearly full. No cotton waste is required. The boxes are sealed, and the oil is evenly distributed over the journal. This distribution is so uniform and precise that in summer water can be used instead of oil. If oil is used, it saves eighty per cent. It will soon be applied to all cars on the Central and Hudson River Road.

A KANSAS paper says that the general impression that a narrow-gauge train must necessarily run at a speed much below that of ordinary gauges, is wholly erroneous. During a trip to Holton the other day, over the Kansas Central, the trains both ways ran a a considerable part of the distance at the rate of thirty-five miles an hour.

Facetiæ.

A DRY-GOODS clerk relates that when he "used to tend store at Syracuse, the old man came round to us one day, and says he, 'Boys, the one who sells the most between now and Christmas gets a vest-pattern as a present.' Maybe we did not work for that vest-pattern! I tell you there were some tall stories told in praise of goods just about that time; but the tallest talker, and the one that had the most cheek of any of us, was a certain Jonah Squires, who roomed with me. He could take a dollar out of a man's pocket when he had only intended to spend a sixpence; and the ladies—Lord bless you! they just handed over their pocket-books to him, and let him lay out what he liked for them. One night Jonah woke me up with, 'By Jo! old fellow, if you think that 'ere's got cotton in it, I'll bring down the sheep that it was cut from and make him own his own wool. 'Twon't wear out, either; wore a pair of pants of that stuff for five years, and they are as good now as when I first put them on. Take it at thirty cents and I'll say you don't owe me any thing. Eh, too dear? Well, call it twenty-eight cents. What d'ye say? Shall I tear it? All right, it's a bargain.' I could feel Jonah's hand playing about the bedclothes for an instant, then rip, tear went something or other, and I hid my head under the blankets, perfectly convulsed with laughter, and sure that Jonah had torn the best sheet from top to bottom. When I awoke next morning I found that the back of my night-shirt was split from tail to collar-band."

Two young princes, the sons of Archduke Charles of Austria, had a warm dispute in the presence of no less a person than that of the august Emperor himself. Greatly excited, one said to the other, "You are the greatest ass in Vienna." Highly offended at a quarrel in his presence, the Emperor interrupted them, saying with indignation, "Come, come, young gentlemen, you forget that I am present!"

"WHERE are you going?" said a young gentleman to an elderly one in a white cravat, whom he knew well, and overtook a few miles from Little Rock. "I am going to heaven, my son. I have been on the way eighteen years." "Well, good-by, old fellow; if you have been traveling toward heaven eighteen years, and got no nearer to it than Arkansas, I'll take another route."

AN Akron, Ohio, cat, relying upon his nine lives to save him, allowed his tail to swell, his spine to curve, and with the "banner cry of hell" emanating from his jaws, waded into a buzz-saw in rapid motion. The cat was never seen again, but the boss sawyer, who always stood with his mouth open while at work, remarked to his assistant that he could taste fiddle-strings and sausage-meat in the air that morning.

IT took all the brains of the human race from the moment when the flood soaked it, down to the nineteenth century of the Christian era to find out how to start a train of cars; and all the brains have been employed ever since to find out how to stop one!

A POOR man, who less than a year ago had only one suit of clothes, went into the newspaper business and has nine suits. One is worn out, and the other eight are libel suits.

A SECOND-HAND furniture dealer in Detroit hung out a card inscribed "Buggy! For Sale!" and inadvertently hung it upon a second-hand bedstead on the sidewalk, where it attracted much attention.

"MEN are what women make them" is the singular title of a new book. It may be true, but we have seen some dreadfully poor specimens of the manufactured article, which fact reflects badly either upon the material or the maker.

A SILVER CITY miner remarked, after attending a prayer-meeting, a few weeks ago, that it was "the first time he had heern the Word of God handled for close on to forty years."

A CLAIRVOYANT trio, two women and a man, have been traveling in the South, pretending to cure epizootic by the "laying on of hands." They practiced on a mule in Kentucky the other day, and the firm has since dissolved.

A GENTLEMAN took the following telegram to a telegraph office: "I announce with grief the death of Uncle James. Come quickly to read will. I believe we are his heirs—John Black." The clerk having counted the words, said, "There are two words too many, sir." "All right; cut out 'with grief.'"

A MAN advertises for a competent person to undertake the sale of a new medicine, and adds that "it will prove highly lucrative to the undertakers."

"WHO dat hit me?" "Where's dat lantern?" were the exclamations of an astonished Elmira darkey one evening, after being thrown something like a hundred feet by a locomotive.

AN old lady was admiring the beautiful picture called "Saved." "It's no wonder," said she, "that the poor child fainted after pulling that great dog out of the water."

A WRITER asks, in an agricultural paper, if any one can inform a poor man the best way to start a nursery. Certainly—get married.

IN Pennsylvania, a frog came out of a man's stomach, where it had lived for fifteen years. It couldn't stand the present style of whisky.

IT is said that a St. Louis editor used to write poetry when a boy and had a reputation in that line extending over an area of country three miles long, four miles wide, and a mile thick.

A GENTLEMAN being asked if his neighbor's dog was a hunter, said it was half hunter and half setter; that he hunted until he found a bone, and then sat down to eat it.

ST. LOUIS has demonstrated the fact that a mule can't be killed by hanging, and half her population breathes easier.

Wilmington.

AT Wilmington, when night drew nigh,
Few were the trains that passed thereby,
And very dreary was the sigh
Of travelers waiting dolefully.

But Wilmington another sight
Saw when the train came late at night,
Commanding oil and gas to light
The dark and quiet restaurant.

By soups and coffee fast allured,
Each passenger a place secured,
Except the drowy souls immured
In heavy sleep's imprisonment.

Then rushed the crowd by hunger driven,
Then vanished buns, in pieces riven,
And louder than the orders given,
Fast popped the ale artillery.

But further yet the train shall go,
And deeper yet shall be their woe,
And greater horrors shall they know,
Who bolt their food so hurriedly.

Time's up! but scarce each seated one
Can pierce the steam-cloud's rolling dun,
Where heavy tart and heavier bun
Lie in dyspeptic sympathy.

The combat thickens. On, ye brave!
Who scald your throats in hope to save
Some spoonfuls of your soup; the knave
Will charge for all he ladles ye.

Few, few digest where many eat;
The nightmare shall wind up their feat;
Each carpet-bag beneath their seat
Shall seem a yawning sepulchre.

Charcoal Roofing Plates,

Russia Sheet Iron,

AND ALL METALS NECESSARY FOR

Car and Locomotive Works.

A. A. THOMSON & CO.,

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WOOD AND IRON WORKING MACHINERY,

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Patent Asbestos Non-Conductor.

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Saves from 25 to 40 per cent in fuel.

Superior to Hair Felt or Clay Materials.

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An Indestructible Coating for Iron, Tin, and Wood.

Prince's Metallic Paint

Is acknowledged, wherever known, to be the

BEST AND CHEAPEST PAINT IN THE MARKET.

N. Y. CENTRAL & HUDSON RIVER R. R. CO. SUPPLY DEP'T,
ALBANY, N. Y., October 25, 1871.

GENTS.: Our Company have used your Metallic Paint for several years. For freight-cars, car-roofs, and buildings it has given us entire satisfaction. Yours, etc.,
M. H. ST. JOHN, Supply Agent.

OFFICE OF J. B. & J. M. CORNELL PLAIN AND ORNAMENTAL IRON WORKS,
NEW-YORK, November 10, 1871.

GENTLEMEN: We have used the Prince's Metallic Paint for several years, and believe it to be the best metallic paint for iron work now in use. Yours, etc., J. B. & J. M. CORNELL.

For Sale, Dry and in Oil, by the Trade, and by

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OF ALL SIZES AND KINDS.

Pig, Tin, Russia Sheet-Iron, Charcoal and Common Sheet-Iron, Lead, Sheet Zinc, Copper, Spelter, Solder, Antimony, Etc.

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SUPERFINE

QUICK DRYING

COACH COLORS.

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OUR OWN SPECIAL BRANDS OF SUPERIOR RAILWAY VARNISHES,

Are now used by some of the most extensive Railroads in the country, and are particularly recommended.

Car Manufacturers.

Allison, W. C. & Sons	Philadelphia, Pa.
Anderson, J. R. & Co	Richmond, Va.
Altoona Manufacturing Co	Altoona, Pa.
Adrian Car Co	Adrian, Mich.
Arlington Car Manufacturing Co	Arlington, Vt.
Atlantic Car Works	Salem, Mass.
Barney & Smith Manufacturing Co	Dayton, Ohio
Baker, Jackson & Co	Latrobe, Pa.
Billmeyer & Smalls	York, Pa.
Bradley, Osgood	Worcester, Mass.
Bridgeport Car Works	Bridgeport, Pa.
Brill, J. G. & Co	Philadelphia, Pa.
Bitner, George W	Pittsburg, Pa.
Buffalo Car Co	Buffalo, N. Y.
Canada Car Co	Toronto, Canada.
Canada Steam-Engine Co	Kingston, Canada.
Canda, F. E & Co	Chicago, Ill.
Cartersville Car Co	Cartersville, Ga.
Central Car & Manufacturing Co	Jackson, Mich.
Clendenning, W. W	Montreal.
Cummings Car-Works	Jersey City, N. J.
Connellsville Machine and Car Co	Connellsville, Pa.
Corunna Car Co	Corunna, Mich.
De Pere Iron Works	De Pere, Wis.
Detroit Car Works	Detroit, Mich.
Detroit Car and Manufacturing Co	Detroit, Mich.
Dawson Manufacturing Co	Dawson, Ga.
Dickey, Neill & Co	Toronto.
Dickson Manufacturing Co	Scranton, Pa.
Erie Car-Works	Erie, Pa.
Elmira Car-Works	Elmira, N. Y.
Frederick & Co	Catasauqua, Pa
Freas Brothers & Thornton	Berwick, Pa.
Fremont Car Co	Fremont, Ohio.
Gardner, F. & Co	Carlisle, Pa.
Gill, John L	Columbus, Ohio.
Gilbert, Bush & Co	Troy, N. Y.
Goold, James & Co	Albany, N. Y.
Goodrich Car Co	Augusta, Ga.
Hannibal Car Works	Hannibal, Mo.
Haskell & Barker Car Co	Michigan City, Ind.
Harrisburg Car Manufacturing Co	Harrisburg, Pa.
Heathcote, Herbst & Co	Glen Rock, Pa.
Hamilton, William & Son	Toronto.
Harlan & Hollingsworth Co	Wilmington, Del
Indiana Car Co	Cambridge City, Ind.
Indianapolis Car Co	Indianapolis, Ind.
Jackson & Sharp Co	Wilmington, Del.
Jackson & Woodin Manufacturing Co	Berwick, Pa.
Jones, J. M. & Co	West-Troy, N. Y.
Kimball Manufacturing Co	San Francisco, Cal.
Keith, H. T. & I. N	W. Sandwich, Mass.
Laporte Car Manufacturing Co	Laporte, Ind.
Lombard, Thomas	Augusta, Me.
Lebanon Manufacturing Co	Lebanon, Pa.
Lehigh Car Manufacturing Co	Stemton, Pa.
Litchfield Car Manufacturing Co	Litchfield, Ill.
Mansfield Machine Works	Mansfield, Ohio.
Michigan Car Co	Detroit, Mich.
McNairy, Claflen & Co	Cleveland, Ohio
Murray, Dougall & Co	Milton, Pa.
McVay, Walker & Co	Braddock's Field, Pa
Mowry Car and Wheel Works	Cincinnati, O.
Middletown Car & Manufacturing Co	Middletown, Pa.
Missouri Car and Foundry Co	St Louis, Mo.
New-Haven Car Co	New-Haven, Ct.
Niblo, James M	Conshohocken, Pa.
Ohio Falls Car Co	Jeffersonville, Ind
Ontario Car Co	London, Ont.
Orbison, Welch & Co	Huntingdon, Pa.
Patten Car Works	Bath, Maine.
Peabody & Crangle Bro's	Calais, Me.
Peters, Simon	Quebec.
Pittsburg and McKeesport Car Co	McKeesport, Pa
Pittsburg Car and Locomotive Co	Pittsburg, Pa.
Portland Co	Portland, Me.
Pullman Car Co	Chicago.
Peregoy, J. H	Houston, Texas.
Ranlet Car Manufacturing Co	Laconia, N. H.
Russell & Co	Massillon, Ohio.
Sands, William L	Pottstown, Pa.
Schoharie Machine Co	Schoharie, N. Y.
Schall, Michael	York, Pa.
Shaaber & Johnston	Reading, Pa.
Southern Car-Works	Independence, La.
South-Western Car Co	Jeffersonville, Ind.
Shoenberger & Bryant	Duluth, Minn.
Seath & Hager	Terre Haute, Ind.
Stephenson, John & Co	New-York, N. Y.
Taunton Car Co	Taunton, Mass.
Tredegar Co	Richmond, Va.
Tiffin Car-Works	Tiffin, Ohio.
Vigo Foundry and Terre Haute Car-Works	Terre Haute, Ind.
Watsontown Car Co	Watsontown, Pa.
Wharton, Thomas J	Brunswick, Ga.
Whittaker, Phillips & Co	Toledo, Ohio.
Wason Manufacturing Co	Springfield, Mass
Weimer, P. L & Bros	Lebanon, Pa.
Wyoming Valley Manufacturing Co	Wilkesbarre, Pa.
Wells, French & Co	Chicago, Ill.
Wilmington Car-Works	Wilmington, Del.

Car-Wheel Manufacturers.

Albany Car-Wheel Works	Albany, N. Y.
American Paper Car-Wheel Co	Pittsford, Vt.
Atlantic Iron-Works	Portsmouth, Va.
Baltimore Car-Wheel Foundry Co	Baltimore, Md.
Barnum & Richardson Manufacturing Co	Chicago, Ill.
Barney & Smith Manufacturing Co	Dayton, Ohio.
Bass & Hanna	Fort Wayne, Ind.
Bailey, Howson & Co	St. Paul, Minn.
Blanchard & Arnold	Milwaukee, Wis.
Boston Car-Wheel Co	Camb'gep't, Mass.
Bowler, Mayer & Brayton	Cleveland, Ohio.
Davenport, Fairbairn & Co	Erie, Pa.
Dawson Manufacturing Co	Dawson, Ga.
Detroit Car-Wheel Works	Detroit, Mich.
Fulton Foundry Co	Cleveland, Ohio.
Gill, John L. Jr	Allegheny City, Pa.
Green, D. P. & Co	St. Louis, Mo.
Hamtramck Car-Wheel Works	Detroit, Mich.
Haskell & Barker Car Co	Michigan City, Ind
Harrisburg Car Manufacturing Co	Harrisburg, Pa.
Heartt, Jonas S. & Co	Troy, N. Y.
Jackson & Woodin	Berwick, Pa.
John L. Gill	Columbus, Ohio.
Lehigh Car-Wheel & Axle Works	Catasauqua, Pa.
Lobdell Car-Wheel Works	Wilmington, Del.
Louisville Car-Wheel & Railway Supply Co	Louisville, Ky.
Middlebrook & Mack	Oswego, N. Y.
Missouri Car and Foundry Co	St. Louis, Mo.
Moore Elastic Car-Wheel Co	Jersey City, N. J.
Mowry Car and Wheel Works	Cincinnati, Ohio.
Ohio Falls Car Co	Jeffersonville, Ind.
Pettengill, Glass & Co	Cleveland, Ohio.
Quealey, W. J	Hannibal, Mo.
Ramapo Wheel & Foundry Co	Ramapo, N. Y.
Rutland Foundry & Machine Co	Rutland, Vt.
Sterling Car-Wheel Foundry	Columbus, Ohio.
Scoville, J. & N. C	Buffalo, N. Y.
St. Louis Car-Wheel Co	St. Louis, Mo.
Taylor Iron Works	High Bridge, N. J.
Thompson, Duglas	Bordentown, N. J.
Tredegar Company	Richmond, Va.
Toronto Car-Wheel Co	Toronto, Can.
Washburn, Hunts & Co	Jersey City, N. J.
Washburn Car-Wheel Manufacturing Co	Worcester, Mass.
Wason Manufacturing Co	Springfield, Mass.
Whitney A. & Sons	Philadelphia, Pa.
Woodbury & Company	E. Cambr'ge, Mass.
Wyoming Valley Manufacturing Co	Wilkesbarre, Pa.

Locomotive Builders.

Baldwin Locomotive Works	Philadelphia, Pa.
Brooks Locomotive Works	Dunkirk, N. Y.
Danforth & Cooke	Paterson, N. J
Dawson & Baily (light locomotives)	Connellsville, Pa
Dickson Manufacturing Co	Scranton, Pa.
Grant Locomotive Works	Paterson, N. J.
Hinckley Locomotive Works	Boston, Mass.
Manchester Locomotive Works	Manchester, N. H.
Mason, William	Taunton, Mass.
McKay Iron and Locomotive Works	Jersey City, N. J.
Portland Company	Portland, Me.
Porter, Bell & Co. (light locomotives)	Pittsburg, Pa.
Pittsburg Locomotive Works	Pittsburg, Pa.
Rogers Locomotive Works	Paterson, N. J.
Rhode Island Locomotive Works	Providence, R. I.
Schenectady Locomotive Works	Schenectady, N. Y.
Taunton Locomotive Works	Taunton, Mass.

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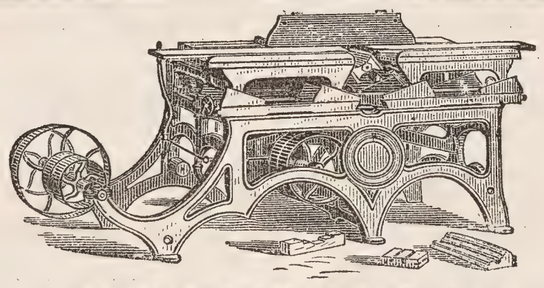

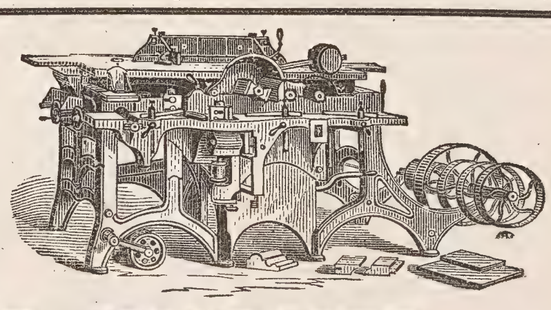

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Alabama Central	E. M. Smith	E. M. Smith	Selma, Ala.
Albany & Susquehanna	R. C. Blackall	R. C. Blackall	Albany, N. Y.
Alexandria & Fredericksburg			Alexandria, Va.
Alexandria, Nebraska & Iowa	Geo. Q. Adams		Alexandria, Mo.
Atchison, Topeka & Santa Fe	H. V. Farris		Topeka, Kans.
Atchison & Nebraska	Selah Williams		Atchison, Kan.
Alabama & Chattanooga	S. W. Tozer	S. W. Tozer	Chattanooga, Tenn.
Atlanta & West-Point	Wm. Rushton		Atlanta, Ga.
Atlanta & West-Point	R. D. Cole	R. D. Cole	Newnan, Ga.
Atlantic & Gulf	C. E. Van Vorst	P. N. Raynal	Savannah, Ga.
Atlantic & North-Carolina	E. J. Clayton	E. J. Clayton	New-Berne, N. C.
Atlantic & Great Western	‡B. H. Kidder	††J. H. F. Wiers	Meadville, Pa.
Atlantic & Great Western	William Fuller	D. S. Dockstader	Meadville, Pa.
Atlantic & Great Western	N. Wright	W. G. Haggard	Cleveland, Ohio.
Atlantic & Great Western	‖J. B. Miller.	S. V. Smith	Kent, Ohio.
Atlantic & Great Western	Allen Cook	J. W. Holmes	Galion, Ohio.
Atlantic & Pacific	§John Hewitt	John Hewitt	St. Louis, Mo.
Atlantic, Mississippi & Ohio			
Norfolk & Petersburg Division	J. S. Whitworth	J. S. Whitworth	Norfolk, Va.
South-Side of Virginia "	J. T. Robinett	J. T. Robinett	Petersburg, Va.
Virginia & Tennessee "	F. Sterk	W. A. Morgan	Lynchburg, Va.
Virginia & Kentucky "			
Allegheny Valley	G. W. Glass	R. Gunning	Pittsburg, Pa.
Androscoggin	Ira K. Russell	C. S. Greenwood	Farmington, Maine.
Adirondack	Jacob Myers	James J. Traver	Saratoga, N. Y.
B			
Baltimore & Ohio	§John C. Davis	J. S. Shryack.	Baltimore, Md.
Baltimore & Ohio		James H. Miller	Baltimore, Md.
Baltimore & Ohio	Wm. Edwards		Martinsburg, Va.
Baltimore & Ohio	A. J. Cromwell		Piedmont, Va.
Baltimore & Ohio	E. W. Lippencott		Grafton, W. Va.
Baltimore & Ohio			Wheeling, W. Va.
Central Ohio Division	Alex. Platt		Zanesville, Ohio.
S'dusky, Mans., & New'k Div.	Wm. Y. Johnson		Sandusky, Ohio.
Bangor, Old Town & Milford	J. B. Peckham	John H. Brown	Bangor, Maine.
Bangor & Piscataquis	Horace Penny	J. W. Comins	Old Town, Maine.
Bellefonte & Snow Shoe	H. D. Landis	H. D. Landis	Bellefonte, Pa.
Belvidere Delaware	R. McDowell	John Silvers	Lambertville, N. J.
Boston & Albany	Wilson Eddy	F. D. Adams	Springfield, Mass.
Boston & Albany	A. B. Underhill	W. E. Chamberlain	Allston, Mass.
Boston & Providence	George Richards	John Lightner	Roxbury, Mass.
Boston, Clinton & Fitchburg	John Webster	Samuel Stevens	Fitchburg, Mass.
Boston, Concord & Montreal	Ralph Adams	M. R. Elkins	Lake Village, N. H.
Boston & Maine	F. A. Waitt		Boston, Mass.
Boston & Maine		D. C. Richardson	Lawrence, Mass.
Boston, Lowell & Nashua	L. R. Winslow		Boston, Mass.
Boston, Lowell & Nashua		S. A. Davis	Nashua, N. H.
Blossburg & Corning	O. C. Patchell	O. C. Patchell	Corning, N. Y.
Brockville & Ottawa	H. J. Marshall	H. J. Marshall	Brockville, Can.
Blue Ridge			Anderson, S. C.
Burlington & Missouri River	G. Chalender		Burlington, Iowa.
Burlington & Missouri River	J. Christiansen		Plattsmouth, Neb.
Burlington, Cedar Rapids & Minn	R. W. Bushnell	James Cantel	Cedar Rapids, Iowa.
Buffalo, New-York & Phila	Allen Vail		Buffalo, N. Y.
Boston, Hartford & Erie	Geo. E. Boyden	Elias E. Pratt	Boston, Mass.
Buffalo, Corry & Pittsburg	Thomas Connell	Thomas Connell	Corry, Pa.
C			
Cairo & Fulton	L. Finlay	L. Finlay	Little Rock, Ark.
California & Pacific	O. R. Ford	D. Rutherford	Vallejo, Cal
Camden & Amboy	F. B. Stevens		Hoboken.
	T. T. Kerr	E. Lockwood	Bordentown, N. J.
	Thomas Single		South-Amboy.
Camden & Atlantic	Rufus Hill	S. Wills	Camden, N. J.
Canada Southern	C. E. Benton	C. E. Benton	St. Thomas, Canada.
Catawissa	A. J. Prescott	C. D. Ellis	Catawissa, Pa
Cape Cod	E. A. Walker	William Cannon	Hyannis, Mass.
Catasauqua & Fogelsville	Thomas Evans	Chas. J. Holbach	Catasauqua, Pa.
Carrolton & Oneida	M. T. Wiggins		Carrolton, Ohio.
Charleston & Savannah	H. T. Calder		Charleston, S. C.
Chesapeake & Ohio	W. G. Freeman	J. N. King	Richmond, Va.
Chesapeake & Ohio	§T. J. Hamer		Huntingdon, W. Va.
Cheraw & Darlington	D. W. Haines	A. M. Corrie	Florence, S. C.
Champlain Trans Co.	H. T. Calder		Burlington, Vt.
Cheshire & Ashuelot	F. A. Perry	A. E. Howard	Keene, N. H.
Charlotte, Columbia & Augusta	Robert King	J. Q. Seats	Columbia, S. C.
Chicago & North-Western	D. Manning		Chicago, Ill.
Chicago & North-western	§Geo. W. Tilton	Thomas Hull	Chicago, Ill.
Wiscon. Mad. & Mill. Divis		Henry Hull	Fond du Lac, Wis.
Galena Division		Hugh Gray	Chicago, Ill.
Wiscon. Mad. & Mill. Divis	T. B. Tilton		Chicago, Ill.
Iowa Division	C. C. Elliott	William Campbell	Clinton, Iowa.
Peninsula Division	S. L Pierce		Escanaba, Mich.
Chicago & Alton	John A. Jackman	R. Reniff	Bloomington, Ill.
Chicago, Burlington & Quincy	‡Geo. Chalender		Burlington, Iowa.
Eastern & Middle Division	E. T. Prindle	W. W. Wilcox	Aurora, Ill.
Galesburg Division	Wm. Wilson		Galesburg, Ill.
Quincy Division	Joel West		Quincy, Ill.
Burlington Division	S. E. Burtch		Burlington, Iowa.
Buda Division	P. R. Sutton		Buda, Ill.
Chicago, Cincinnati & Louisville	C. F. Kidder	D. B. Howe	La Porte, Ind.
Chicago, Clinton & Dubuque	P. R. Sutton		Dubuque, Iowa.
Chicago, Dubuque & Minnesota	P. R. Sutton		Dubuque, Iowa.
Chicago, Rock Island & Pacific	T. B. Twombly	B. K. Verbryck	Chicago, Ill.
Chicago & Michigan Lake Shore	Wm. L. Fitch	Oliver Udell	St. Joseph, Mich.
Chicago, Danville & Vincennes	A. B. Bedell	W. H. Dunham,	Momencee, Ill.
Chicago, Danville & Vincennes	J. M. Sanborn		Chicago, Ill.
Chicago, Danville & Vincennes		W. H. Dunham	Danville, Ill.
Chicago & Canada Southern	§§J. Johann		Trenton. Mich.
Cleveland, Col., Cin., & Indianapolis	‡L. S. Young	William F. Smith	Cleveland, Ohio.
Indianapolis Division	L. W. Durgin		Galion, Ohio.
Indianapolis Division		R. Attridge	Indianapolis, Ind.
Cincinnati Divison	D. Carmichael		Delaware, Ohio.
Columbus Division	F. G. Kaufholz		Cleveland, Ohio.
Cleveland and Pittsburg	N. E. Chapman	A. Steinbrunner	Cleveland, Ohio.
Cleveland, Mt Vernon & Delaware	J. W. Holloway	J. W. Holloway	Akron, Ohio.
Cincinnati, Hamilton & Dayton	William Cullen.	W. H. H. Allison	Cincinnati, Ohio.
Cincinnati & Indianapolis Junction	W. McKinzie	Edwin Beeny	Indianapolis, Ind.
Cincinnati, Lafayette & Chicago	Charles E. Gore		Lafayette, Ind.
Cincinnati & Muskingum Valley	Leroy Kells	Daniel Jewell	Lancaster, Ohio.
Cincinnati, Sandusky & Cleveland	John Y. Beattie	John Y. Beattie	Sandusky, Ohio.
Cobourg, Peterboro & Marmosa	Wm. Polson		Cobourg, Canada.
Columbus, Chicago & Indiana Central	(See Pitts. Cinn. & St. Louis)		
Concord	Chs. L. Eastman	M. W. Dickerman	Concord, N. H.
Concord & Portsmouth	C. L. Eastman	M. W. Dickerman	Concord, N. H.
Concord & Claremont	J. N. Lander	A. Langmaid	Concord, N. H.
Connecticut River	§Wm. H. Stearns		Springfield, Mass.
Connecticut Valley	C. W. Hollister	N. A. Smith	Hartford, Ct.
Connecticut Western	N. Slingland		Hartford, Ct.
Contoocook River			Concord, N. H.
Conn. & Passumpsic Rivers	Horace Alden	Horace Alden	Lyndon, Vt.
Cumberland Valley	A. S. Hull	C. W. NitterhouseChambersburg, Pa.	
Cumberland & Pennsylvania	W. L. Jordan	J. W. Sauerbach	Mt. Savage, Md.
Central of Georgia		C. C. Millar	Savannah, Ga.
Central of New-Jersey	*T. W. Peeples	George Hackett	Elizabethport, N. J.
Lehigh & Susquehanna Div	L. C. Brastow	L. C. Brastow	Wilkesbarre, Pa.
Central Branch Union Pacific	Wm D. Rowley		Atchison, Kansas.
Central R. R. of Iowa	F. B. Woodruff	T. L. Seevers	Marshall, Iowa
Central Pacific	A. J. Stevens	Benjamin Welch	Sacramento, Cal.
D			
Dakota & Southern	Jas. Whitney	A. A. Meckling	Sioux City, Iowa.
Davenport & St. Paul's	George Gregg	George Gregg	Davenport, Iowa.
Dayton & Union	A. J. Keenan	J. F. Feicht	Dayton, Ohio.
Danbury & Norwalk	Charles A. Craig	C. A. Craig	Danbury, Ct.
Dayton & Michigan	William Cullen	W. H. Allison	Cincinnati, Ohio
Denver & Rio Grande	John Greenwood		Denver, Col.
Delaware, Lackawanna & Western	Walter Dawson	Robert McKenna	Scranton Pa.
Morris & Essex Division	W. H. Lewis	L S. Barber	Hoboken, N. J.
Des Moines Valley	James Lamb	R. E. Smith	Keokuk, Iowa.
Detroit, Ft. Wayne & Logansport	W. A. Carpenter		Bankers, Mich.
Detroit & Milwaukee	Andrew Wilson		Detroit, Mich.
Detroit, Lansing, & Lake Michigan	Tho. G. Roberts		Detroit, Mich.
Delaware & Hudson Canal Co	James Dickson	Thomas Orchard	Carbondale, Pa.
Rensselaer & Saratoga Div			Troy, N. Y.
Dorchester & Delaware			Cambridge, Md.
Dubuque South western	I. M. Smith	I. M. Smith	Farley, Iowa.
Dutchess & Columbia	W. G. Vanbuskirk	H. A. Webster	Fishkill, N. Y.
Dunkirk, Allegheny Val. & Pittsburg	J. C. Haggett	J. C. Haggett	Dunkirk, N. Y.
E			
Eastern		J. P. Somerby	Salem, Mass.
Eastern	John Thompson		East-Boston, Mass.
Eastern Kentucky	D. L. Weaver	D. L Weaver	Riverton, Ky.
East-Tennessee & Virginia	Eli Hixon	Jos. Armbruster	Knoxville, Tenn.
East-Tennessee & Georgia	Eli Hixon		Knoxville, Tenn.
East Pennsylvania		Samuel Reeves	Reading, Pa.
Elizabethtown and Paducah	W. D. Robb	T. A. Cordrey	Elizabethtown, Ky
Erie Railway	‖M. E. Brown		Susquehanna, N. Y
Erie Railway	James B. Gregg		Susquehanna, N. Y
Erie Railway	H. L. Brown	C. A. Smith	Jersey City, N. J.
Erie Railway	J. G. Hubbard	M. Wilder	Buffalo, N. Y.
Erie Railway	W. E. Cooper	W. E. Cooper	Hornellsville, N. Y
Erie Railway		W. E. Rutter	Elmira, N. Y
Evansville & Crawfordsville	John L. White	Joseph Stiker	Evansville, Ind.
Evansville, Henderson & Nashville	H. M. Smith	W. H. H. Price	Henderson, Ky.
European & North Am. (of Maine)	A. O. Bailey	J. H. Brown	Oldtown, Maine.
Erie & Pittsburg	G. J. Parkin	G. J. Parkin	Erie, Pa.
Evansville, Terre Haute, & Chicago			Terre Haute, Ind.
F			
Flushing & North Side	Wm. La Suer		College Point, L. I.
Florida	Ezra Gray	G. Hernandez	Fernandina, Fla.
Flint & Pere Marquette	Sanford Keeler	Sanford Keeler	East-Saginaw, Mich.
Fitchburg	Geo. A. Cooledge	Enos Varney	Charlestown, Mass.
Fitchburg & Worcester	John Webster	Samuel Stevens	Fitchburg, Mass.
G			
Galveston, Harrisburg & San Antonio	Jno. G. Coulon		Galveston, Texas.
Gilman, Clinton & Springfield	W. B. McKenna		Springfield, Ill.
Grand Tower & Carbondale	Hugh Smith	Hugh Smith	Grand Tower, Ill.
Grand Trunk		Warren Noyes	Gorham, Me.
Grand Trunk	†Richard Eaton	J. W. W. McWood	Montreal, Canada.
Grand Trunk		Howard Fry	Sherbrooke, Can.
Grand Trunk		B. J. Mitchell	Portland, Me.
Galveston, Houston & Henderson	Wm. Macbeth	Wm. Macbeth	Galveston, Texas.
Grand Rapids & Indiana	J. M. Boon		Fort Wayne, Ind.
Great Western of Canada	†Wm. A. Robinson	F. Childs	Hamilton, Canada.
Georgia	William Hardman	T. M. Preval	Augusta, Ga.
Green Bay & Lake Pepin	I. H. Erwin		Green Bay, Wis.
Greenville & Columbia	J. T. Price	J. T. Price	Helena, S. C.
H			
Harlem Extension	George W. Blanchard		Rutland, Vt.
Harlem Extension		C. S. Clapp	Bennington, Vt.
Hanover Branch	John J. Bingley	Henry Britcher	Hanover, Pa.
Hartford & New-Haven	John O. Chapman	F. Leppense	Hartford, Ct.
Hannibal & St. Joseph	H. A. Towne	H. C. Whiting	Hannibal, Mo.
Hartford, Providence & Fishkill	Edwin Garfield	V. D. Perry	Hartford, Ct.
Hackensack & New-York	Abra'm Angausen		Hackensack, N. J.
Housatonic	C. R. Morris	J. J. Ferris	Bridgeport, Ct.
Houston & Texas Central	§W. H. Purdy	W. H. Purdy	Houston, Texas.
Houghton & Ontonagon			L'Anse, Mich.
Houston Tap & Brazoria	T. J. Shellhorn	T. J. Shellhorn	Houston, Texas.
Huntington & Broad-Top Mountain	J. Salisbury	M. Tellerhoof	Saxton, Pa.
Hempfield	T. Marsh		Wheeling, Va
I			
Indianapolis, Cincinnati & Lafayette	J. S. Patterson	S. Griffith.	Cincinnati, Ohio.
Indianapolis, Peru & Chicago	John McKenna	John McKenna	Peru, Ind.
Illinois Central	**S. J. Hayes	H. O. Wadlie	Chicago, Ill.
Chicago Division	Henry Schlacks		Chicago, Ill.
South ivision	David Oxley		Centralia, Ill.
North Division	J. B. Edams		Amboy, Ill
Iowa Division	Thomas W. Place		Waterloo, Iowa.
Iowa & Missouri State Line			Farmington, Iowa.
Iron	Perry Scott	Clem. Roetling	Ironton, Ohio
Indianapolis & St. Louis	Wm. Barkla	R. B. More	Mattoon, Ill.
Indianapolis, Bloomington & Western	Tho. V. Losee	Tho. V. Losee	Urbana, Ill.
Ionia & Lansing	H. Loughlin		Lansing, Mich.
Indianapolis & Vincennes	A. E. Allcott		Indianapolis, Ia.
International & Great Northern	T. J. Shellhorn	F. M. Looney	Houston, Texas.
Intercolonial	Wm. Whitney	Edw. Shaffer	Moncton, N. B.
Ithaca & Athens	F. A. Brown		Ithaca, N. Y.
J			
Jeffersonville, Madison & Indiana	Reuben Wells		Jeffersonville, Ind
Junction & Breakwater	J. A. Maguire		Lewes, Del.
K			
Kansas Central	John Davis		Leavenworth, Kan.
Knox & Lincoln	§§E. R. Hamlin	Benj. Soule	Bath, Maine.
Kentucky Central	J. R. Ledyard	J. L. Hackathorn	Covington, Ky.
Knoxville & Charleston			Knoxville, Tenn.
Kansas Pacific	**L. H. Waugh		Wyandotte, Kansas.
Denver Pacific Div	**L. H. Waugh		Wyandotte, Kansas.
Denver & Boulder Valley Div	**L. H. Waugh		Wyandotte, Kansas.
Junction City & Ft. Kearney Div	**L. H. Waugh		Wyandotte, Kansas.
Arkansas Valley Div	**L. H. Waugh.		Wyandotte, Kansas.
Kalamazoo, Allegan & Grand Rapids			Kalamazoo, Mich.
Kansas City, St. Joseph & Council Bluff	H. L. Cooper	H. L. Cooper	St. Joseph, Mo
King's Mountain	E. Thomas	E. Thomas	Chester, S. C.
L			
Lake Erie & Louisville	John Pero		Fremont, Ohio.
Lake Superior & Mississippi	R. B. Small		St. Paul, Minn.
Lackawanna & Bloomsburg	Chas. Graham	Chas. Graham	Kingston, Pa.
Lehigh Valley	John I. Kinsey	E. R. Brown	South-Easton, Pa.
Lehigh Valley	P. Hofecker		Weatherly, Pa.
Lehigh Valley	A. Mitchell	Mauch Chunk, Pa.	Delano, Pa.
Lehigh Valley	D. Clark		Hazleton, Pa.
Leavenworth, Lawrence & Gal	S. M. Philbrick		Lawrence, Kansas.

Railroad.	*Master-Mechanic.*	*Master-Car-Builder.*	*Residence.*
Lexington & Big Sandy	Fred. Weber	R. Brainard	Ashland, Ky.
Little Rock & Fort Smith	D. R. Wing	D. R. Wing	Argenta, Ark.
Little Miami	J. H. Setchel.		Cincinnati, Ohio.
London & Port Stanley			London, C. W.
Louisville, New-Albany & Chicago	Geo. Ruhlandt	Geo. Helfrich	New-Albany, Ind.
Long Island	Chs. A. Thompson.		Hunter's Point, L I.
Louisville, Cincinnati & Lexington	E. B. Gibbs	S. S. Pilson	Louisville, Ky.
Louisville & Nashville	†Thatcher Perkins		Louisville, Ky.
Louisville & Nashville	D. P. Rennie	Isaac M. Owens	Louisville, Ky.
Louisville & Nashville	Jas. Montgomery		Bowling Green, Ky.
Nashville & Decatur Division	John Skidmore		Nashville, Tenn.
South & North Ala. Div.	Thos Jeffers	W. L. Gude	Birmingham, Ala.
South & North Ala. Div	C. H. Beale		Montgomery, Ala.
Memphis & Ohio Div.	Thos. Walsh	R. M. C. Parker	Memphis, Tenn.
Lake Shore & Michigan Southern	‡James Sedgley	††John Kirby	Cleveland, Ohio
Michigan Southern Division	William Hill		Elkhart, Ind.
" " "		S. S. Knapp.	Adrian, Mich.
Toledo Division	Geo. H. Tier	Frank O. Bray	Norwalk. Ohio.
Erie Division	L. O. Gassett.	J. Withyecombe.	Cleveland Ohio.
Buffalo Division	W. L. Wallace	A. Robson	Buffalo. N. Y.
Lake Shore & Tuscarawas Valley	Charles Fellows	J. D. McIlwain	Black River. Ohio.
Lake Ontario Shore	J. C. Schermerhorn.	J. C. Schermerhorn.	Oswego, N. Y.

M

Marquette, Houghton & Ontonagon	A. P. Burroughs.	H. D. Lyons	Marquette, Mich.
Macon & Augusta			Macon, Ga.
Maine Central	J. H. Philbrick	J. H. Philbrick	Waterville, Me.
Macon & Western	D. M. Gogul	James A. Knight.	Macon, Ga
Manchester & Lawrence	Chas. L. Eastman.	M. W. Dickerman.	Concord, N. H.
Marietta & Pittsburg	W. J. Adams		Marietta, Ohio.
Maryland & Delaware	J. L. Caldwell		Easton, Md.
Macon & Brunswick	M. Thornton.	M. Thornton.	Macon, Ga.
Marietta & Cincinnati	E. Bosley	E. Bosley	Chillicothe, Ohio
Memphis & Little Rock	Tho. Rennells	P. Twitchell.	Argenta, Ark.
Memphis & Charleston	A. Ross	A W. Drew	Memphis, Tenn.
Memphis & Charleston	H. N. Burford	Fabien Varin	Huntsville, Ala.
Mineral Point	Robert Hay		Mineral Point. Wis.
Mississippi & Tennessee	Geo. Hazenger	J. Riny	Memphis, Tenn.
Mississippi Central	Henry Gibbon.	John E. Becton	Water Valley. Miss
Maryland & Delaware	Samuel Peters		Greensboro, Md.
Mississippi, Gains. & Tus			Gainsville, Ala.
Midland Pacific			Nebraska City, Neb.
Milwaukee & St. Paul	T. S. Davis	Wm. E. Kittrege	Milwaukee, Wis.
Milwaukee & St. Paul		John Baillie	Milwaukee, Wis.
Milwaukee & St. Paul	J. Pattee	D. F. Wilson	Minneapolis, Minn.
Hastings & Dakota Division	C. C. Clements		Hastings, Minn.
Michigan Central	A. S. Sweet, Jr.	J. B. Sutherland.	Detroit, Mich.
Grand River Valley Division		James Potts	Jackson, Mich.
J'kson, Lans'g & Saginaw Div.	Andrew Wilson	Andrew Wilson	Jackson Mich.
Montgomery & West-Point	J. McVey	J. T. Daniels	Montgomery, Ala.
Montgomery & Eufaula	I. W. Hewlet	T. J. Burton	Montgomery, Ala.
Mobile & Montgomery	James McFarland.	L. Barham	Montgomery, Ala
Mobile & Girard	C. D. Wall		Girard, Ala.
Mobile & Ohio	L. J. Fleming / B. S. Skates	John McHugh / B. S. Skates	Mobile, Ala. / Whistler, Ala.
Missouri River, Fort Scott & Gulf	John S. McCrum		Kansas City, Mo.
Missouri River, Fort Scott & Gulf		Josiah Stahl	Wyandotte, Kan.
Missouri, Kansas & Texas		J. Townsend	Sedalia, Mo.
Missouri, Iowa & Nebraska	Geo. Adams	Geo. Adams	Alexandria, Mo.

N

Nashville & Chattanooga	John U. Eastman.	J. G. Sawyer	Nashville. Tenn.
New-Bedford & Taunton	Robert Chase	Robert Chase	New-Bedford, Mass.
New-Canaan			New-Canaan, Ct.
New-Brunswick & Canada	T. Armstrong	T. Armstrong	S'nt Andrew's, N.B.
New-Haven & Northampton	Henry Fox	Henry Fox	New-Haven, Ct.
New-York, Kingston & Syracuse	A. Q. Mackenbush.	G. Dikeman	Syracuse, N. Y.
New-York & Harlem.	Wm. M. Strong	Leander Garey	New-York.
New-York Central & Hudson River	‡G. B. Van Vorst		Albany. N. Y.
New-York Central & Hudson River	Henry Watkeys		Syracuse, N. Y.
New-York Central & Hudson River	Amos Gould		Rochester, N. Y.
New-York Central & Hudson River	Jas. Butman	Wm. Johnson	Buffalo, N. Y.
New-York Central & Hudson River	Wm. Buchanan	John McKenna	New-York.
New-York Central & Hudson River	John Dikeman		East-Albany, N. Y.
New-York Central & Hudson River		Joseph Jones	West-Albany, N. Y.
New-York Central & Hudson River		George Rowe	Niagara Falls, N.Y.
New-York, Boston & Montreal		H. A. Webster	Dutchess Junc., N.Y.
New-York & Oswego Midland	§Wm. H. Griggs	Wm. H. Griggs	Oswego, N. Y.
New-Jersey Division	J. F. Sechler		Wortendyke, N. J.
New-Jersey Division		J. A. Read	Pompton, N. J
New-York, Providence & Boston.	Jas. H. Anderson.	Jas. H. Anderson.	Providence, R. I.
New-York, New-Haven & Hartford	§§H. Kittendorf	James Denver	New-Haven, Ct.
New-York, New-Haven & Hartford	J. O. Chapman	F. Leppens.	Hartford, Ct.
New-Jersey Southern	Rufus Blodgett.		Manchester, N. J.
New-Haven & Derby			New-Haven, Ct.
New-Orleans, Opelousas & Gt. Western.	John McCluskey.	Matthew Nolan	Algiers, La.
New-Lisbon			Leetonia, Ohio.
New-Orleans & Ohio	John R. Jordan	John R. Jordan	Paducah, Ky.
New-Orleans, Jackson & Gt. Northern.	N. Greener	N. Greener	New-Orleans, La.
New-Haven, Hartford & Springfield			Hartford. Ct.
Naugatuck	Henry Hanford	George W. Gray	Bridgeport, Ct.
North-Carolina	Rufus D. Wade	B. G. Sergeant.	Co. Shops, N. C.
North-Louisiana & Texas	C. H. Tull		Monroe, La.
New-Orleans, Mobile & Texas	J. R. White		New-Orleans, La.
Northern Central	C. M. Lewis		Baltimore, Md.
Northern Central		G. W. Demarest.	York, Pa.
North-Lebanon		Henry B. Oves	Lebanon. Pa.
North-Pennsylvania	Franklin Roop.	Franklin Roop	Philadelphia, Pa.
North-Eastern.	D. W. Haines	A. M. Corrie	Florence, S. C.
Northern	James W. Lander.	Albert Langmaid.	Concord, N. H.
Northern of New-Jersey	T. W. Demorest		New-York.
Norwich & Worcester	Richard Colburn	G. R. Bentley	Norwich, Ct.
Northern of Canada	P. Clark.	P. Clark	Toronto, Can.
Northern Pacific	§§Geo. W. Cushing		St. Paul, Minn.

O

Old Colony & Newport	J. K. Taylor	A. Gleason	Boston, Mass.
Oil City & Pithole	George Thompson		Pithole, Pa.
Oil Creek & Alleghany River	J. S. McElroy	Jacob Williams	Corry, Pa.
Oil Creek & Alleghany.	H.J.Bookhammer.	John Monks	Oil City, Pa.
Ohio & Mississippi		G.Hibbard	Cochran, Ind.
East Division	A. Thompson		Cochran, Ind.
West Division	H. Elliott	G. H. Thompson	East St. Louis, Ill.
Oregon & California	§§J. Brandt.		Portland, Oregon.
Owensburg & Russellville	J. R. Osborne		Owensburg, Ky.

P

Paducah & Memphis	J. D. Linning		Paducah, Ky.
Painesville & Youngstown	G. R. Crane		Painesville, Ohio.
Paris & Decatur	John G. Clifford	G. Clifford	Paris, Ill.
Panama	Chas. E. Stewart.	J. G. Wilson	Aspinwall, N. G.
Pacific of Missouri	§§John Hewitt	John Hewitt	St. Louis, Mo.
Pennsylvania	§§F. Thomson		Altoona, Pa.
Pennsylvania	H. D. Garrett	I. W. Van Houten.	W. Philadelphia, Pa.
Pennsylvania	E. L Caum	Samuel W. Myers.	Harrisburg, Pa.
Pennsylvania	G. W. Strattan	John P. Levan	Altoona, Pa.
Pennsylvania	D. O. Shaver.	R. S. Ramsey	Pittsburg, Pa.
New-Jersey Division.	John Headden	David H. Baker.	Jersey City, N. J.
West-Penn. Division	C. B. Street.	James F. Elder	Blairsville, Pa.
Philadelphia and Erie	Martin Walls / W. L Forster / W. L. Holman / W. T. Smith / §§T. N. Ely		Sunbury, Pa. / Renovo, Pa. / Kane, Pa. / Erie, Pa. / Erie, Pa.
Philadelphia, Wilmington & Baltimore	S. A. Hodgman	Wm. T. Worth	Wilmington, Del.
Philadelphia & Reading	L. B. Paxson	Aaron Steinbach.	Reading, Pa.
Germantown & Norris'n Div.	Jackson Richards		Philadelphia, Pa.
Philadelphia & Baltimore Central	S. D. Danfield.	Samuel D. Danfield.	Chester, Pa.
Pittsburgh, Cincinnati & St. Louis			
Pittsburgh & Columbus Division	E. Pierce		Dennison, Ohio.
Pittsburgh & Columbus Division		James McGee	Steubenville, Ohio.
Little Miami Division		M. P. Ford	Columbus, Ohio.
Little Miami Division	J. H. Setchel		Pendleton. Ohio.
Col., Cin. & Ind. Division	Robert Curtis	Tho. Chamberlain	Columbus, Ohio.
Col., Cin. & Ind. Division	Geo. H. Prescott	Geo. H. Prescott	Logansport, Ind.
Peoria & Rock Island	Theo. Mosher		Peoria, Ill.
Pittsburg. Fort Wayne & Chicago	S. M. Cummings.	John Marquis.	Alleghany, Pa.
Pittsburg, Fort Wayne & Chicago	J. M. Boon.	J. M. Boon	Fort Wayne, Ind.
Pittsburg, Fort Wayne & Chicago		J. J. Kirkland	Crestline, Ohio.
Pittsburg, Washington & Baltimore	A. S. Kinzie		Connellsville, Pa.
Peoria, Pekin & Jacksonville	R. F. Hurd	Jas. J. Doyl.	Pekin, Ill.
Peninsular	T. G. Templeton.		Battle Creek, Mich
Portland & Rochester	John G. Brady	John G. Brady	Portland, Me.
Portland & Kennebec	John Ellis	C. H. Kenison.	Augusta, Me.
Portland & Oxford Central.	Geo. W. Battles.	Geo. W. Battles.	Buckfield, Me.
Portland, Saco & Portsmouth.	John Donnell		Portland, Me.
Port Royal.	C. W. Furber	E. Hubard	Port Royal, S. C.
Port Hope, Lindsay & Beaverton	H. G. Taylor	H. G. Taylor	Port Hope, Can.
Port Huron & Lake Michigan	R. C. Stewart	R. C. Stewart	Port Huron, Mich.
Providence, Warren & Bristol	Rufus Smith	J. Brightman.	Bristol, R. I.
Portsmouth, Gt. Falls & Monmouth.	James Tucker	E. Fall	Union Village, N.H.
Petersburg & Weldon	R. B. Andrews	Alex. Wright	Petersburg, Va.
Providence & Worcester.	Joseph Kelly	Olney L. Smith	Providence, R. I.
Poughkeepsie & Eastern	John L. Driscoll.	Jerry Wigg	Poughkeepsie, N Y.

R

Raleigh & Gaston.	J. B. Gayle	J. B. Gayle	Raleigh, N. C.
Richmond, Fredericksburg & Potomac.	H. Kuhn	W. H. Trainham.	Richmond, Va.
Richmond, Danville & Piedmont	John McFarland.	H, Longest	Richmond, Va.
Richmond & Petersburg	John O'Brien	H. L. Carter	Richmond. Va.
Richmond & York River	C. H. Harris	J. L. Thompson.	Richmond. Va.
Rome, Watertown & Ogdensburg	Wm. Jackson	H. H. Sessions	Rome, N. Y.
Reading & Columbia	B. Van Lew		Columbia, Pa.
Rome, Georgia	O. W. Harbin.	O. W. Harbin	Rome, Ga.
Rochester & Genesee Valley	M. E. Brown.	M. Wilder	Buffalo, N. Y.
Rockford, Rock Island & St. Louis	Joseph Elder.	J. F. Nolte	Beardstown, Ill.

S

Saginaw Valley & St. Louis	W. S. Thompson		Saginaw, Mich.
Southern Pacific of California	J. P. Wilson	F. N. Bellisle	San Francisco, Cal.
St. Croix & Lake Superior			New-York City.
St. Croix & Penobscot	Edward Bolton	A G. Page	Milltown, Me.
St. Lawrence & Ottawa	Calvin Dame.	Calvin Dame.	Prescott, Canada.
St. Louis & Iron Mountain	O. A. Haynes	Oscar Doolittle.	Carondelet, Mo.
St. Joseph & Denver City	E. Sleppy		St. Joseph. Mo.
San Antonio & Mexican Gulf.	W. T. Bingham.		Victoria, Texas.
South Side of Long Island	Geo. H. Griggs	M. Heitzman	Williamsburg, L. I.
St. Paul & Pacific	J. C. Monroe	T. W. Heathcote	St. Paul, Minn.
St Paul & Sioux City	F. C. Butterfield.	J. W. Lydic.	Shakopee, Minn.
St. Louis. Vandalia, T. Haute & Ind.	C. R. Peddle.	H. Kirmse	Terre Haute, Ind.
Indianapolis Division	Wm. Riley		Terre Haute, Ind.
Vandalia Division	A. J. Sanborn.		Effingham, Ind.
South-Carolina	W. B. Smith	John Reed	Charleston, S. C.
Southern Central	Chas. G. Brown.	H. Mooney	Auburn, N. Y.
Southern Minnesota	Wm. Lininger		Wells, Minn.
South-Western of Georgia	C. D. Wall.		Columbus, Ga.
South-Western of Georgia	D. M.Gogul	James A. Knight.	Macon, Ga.
South Shore	Warren E. Ray		Cohasset, Mass.
Stanstead, Shefford & Chambly	W. H. Smith		Waterloo, C. E.
Seaboard & Roanoke	§E. G. Ghio	J. B. Pendleton	Portsmouth, Va.
Stonington & Providence	J. H. Anderson.	J. H. Anderson.	Providence, R. I.
Selma & Gulf	Wm. T. Daughtrey.		Selma, Ala.
Selma, Rome & Dalton.	A. G. Maynes.	W W. Peirce	Selma, Ala.
Sioux City & Pacific	C. H. Foster		Missouri Val., Iowa.
Spartanburg & Union	J. N. Benner	Jacob Rice	Union C. H., S. C.
Sheboygan & Fond du Lac	A. F. Wallace.	A. F. Wallace.	Sheboygan. Wis.
Sullivan & Erie			Tonawanda. Pa.
Syracuse, Binghamton & New-York	H. H. Dawson	David Burling	Syracuse, N. Y.
Syracuse Northern	W. Garrison	L. W. Smith	Syracuse, N. Y.
Sycamore & Cortland			Sycamore, Ill.
St. Louis, Alton & Terre Haute.	**Beriah Warren		St. Louis, Mo.
St. Louis & South-Eastern	L. B. Salisbury.		Mt. Vernon. Ill.
Nashville Division	H. M. Smith	W. H. H. Price	Nashville, Tenn.
St. Louis, Kansas City & Northern.	H. S. Smith	C. S. Buck.	Moberly, Mo.

T

Taunton Branch.			Taunton, Mass.
Tioga	Peres Bonny	D. H. Stratton	Blossburg, Pa
Texas & New-Orleans	R. B. Baer		Houston, Texas.
Tennessee & Pacific	William McKeand.	William McKeand.	Nashville, Tenn
Toledo, Wabash & Western	W. F. Ray.		Fort Wayne. Ind.
Toledo, Wabash & Western		David Hoit	Toledo. Ohio.
Toledo, Wabash & Western	T. G. Gorman		Springfield, Ill.
Toledo, Peoria & Warsaw	A. H. De Clerq	R. M. Hemphill	Peoria. Ill.
Troy & Boston	Foster Church	R. V. Coon	Troy, N. Y.
Toronto, Grey & Bruce.		Wm. Bowstead	Toronto, Can.
Toronto & Nipissing	J. Haggus		Toronto, Canada.

U

Union Pacific	§I. H. Congdon	Geo. E. Stevens	Omaha, Nebraska
Utah Central	Thos. Pierpont	Edward Cox	Salt Lake City.
Utica & Black River	Wm. E. Granger.	David James	Utica, N. Y.
Utica, Chenango & Susquehanna	C. H. Brown		Utica, N. Y.

V

Vicksburg & Brunswick	James Boon	J. A. Knight	Eufaula, Ala.
Vicksburg & Meridian	Jas. B. Browne		Vicksburg, Miss.
Vineland			Vineland, N. J.
Vermont Central	J. M. Foss	J. M. Foss	St. Albans, Vt.
Rutland Division	N. L. Davis	F. M. Sessions	Rutland, Vt
New-London Northern Division.	J. W. Dow	S. W. Caulkins	New-London, Ct.
Ogdensburg & L. Champlain Div.	William A. Short.	J. R. Ames	Malone, N. Y.
Vermont & Massachusetts	D. T. Davis	Jacob Marsh	Fitchburg, Mass.

W

Wash. City, Va. Midland & Gr. Southern			Alexandria, Va.
Western Union	John Taylor	E. A. Eddy	Racine, Wis.
Wicomico & Pocomoke			Berlin, Md.
Wilmington, Charlotte & Rutherford	W. A. Gill	Thomas Myers	Laurenburg. N. C.
Wilmington, Columbia & Augusta	George Hall	W. J. Calais	Wilmington, N. C.
Westchester & Philadelphia	John Moyer	N. Pawling	Philadelphia. Pa.
Wilmington & Weldon	John Bissit.	John Bissit	Wilmington. N. C.
Wilmington & Western			Wilmington, Del.
West-Jersey	W. McAllister	C. C. Williams	Camden, N. J.
Western Maryland	Wm. Lannan	J. H. Nussear	Union Bridge, Md.
Winona & St. Peter	F. C. Ford	H. L. Preston	Winona, Minn.
Western North-Carolina	J. D. Hollister		Salisbury, N. C.
Western R. R. N. C	M. W. Atkinson.	M. W. Atkinson	Fayetteville, N. C.
West-Feliciana	R. C. Brower	Wm. Grawling	Woodville, Miss.
Western & Atlantic	John H. Flynn	Wm. Grambling	Atlanta, Ga.
Worcester & Nashua	Albert Griggs.	Albert Griggs	Worcester, Mass.
Welland	James Taylor	James Chase	St. Catharine. C. W.
Washington & Ohio	Edward Dunn	Joshua Harrison	Alexandria. Va.
White Water Valley	A. W. Britton		Harrison, Ohio.

DIRECTORY

OF

Railway Superintendents and Purchasing Agents

THROUGHOUT THE UNITED STATES AND CANADA.

REFERENCES.—* General Manager. † Managing Director.

A

Railroad.	*Superintendent.*	*Purchasing Agent.*	*Residence.*
Arkansas Central	James E. Gregg		Helena, Ark.
Alabama Central	John M. Bridges		Montgomery, Ala.
Albany & Susquehanna	H. A. Fonda	D. W. C. Ramsey.	Albany, N. Y.
Alexandria & Fredericksburg	E. L. Dubarry		Washington, D. C.
Atchison, Topeka & Santa Fe	G. H. Nettleton	G. H. Nettleton	Topeka, Kansas.
Atchison & Nebraska	C. C. Smith	C. C. Smith	Atchison, Kansas.
Alabama & Chattanooga	R. Cravath	J. C. Stanton, Jr.	Chattanooga, Tenn.
Atlanta & West-Point	L. P. Grant		Atlanta, Ga.
Atlantic & Gulf	H. S. Haines		Savannah, Ga.
Atlantic & North-Carolina	E. G. Stanley		New-Berne, N. C.
Atlantic & Great-Western	I. D. Barton	R. B. Browne	Meadville, Pa.
First and Second Division	A. L. Dunbar		" "
Third and Fourth "	T. A. Phillips		Galion, Ohio.
Mahoning Division	J. M. Ferris		Cleveland, Ohio.
Atlantic & Pacific	A. A. Talmage	W. H. Patriarche.	St. Louis, Mo.
Atlantic, Mississippi & Ohio	Henry Fink		Lynchburg, Va.
Allegheny Valley	J. J. Lawrence	J. J. Lawrence	Pittsburg, Pa.
Adirondack	C. H. Ballard		Saratoga, N. Y.

B

Baltimore & Ohio	Thos. L. Sharp	Benj. Williams	Baltimore, Md.
Central Ohio & Lake Erie Div.	W. C. Quincy		Columbus, Ohio.
Bangor & Piscataquis	L. H. Eaton	L. H. Eaton	Bangor, Maine.
Boston & Albany	C. O. Russell		Springfield, Mass.
Boston & Providence	A. A. Folsom	A. A. Folsom	Boston, Mass.
Boston, Clinton & Fitchburg	H. A. Blood		Fitchburg, Mass.
Boston, Concord & Montreal	J. A. Dodge	Lyon & Vose	Boston, Mass.
Boston & Maine	William Merritt	M. E. Wood	Boston, Mass.
Boston, Lowell & Nashua	J. B. Winslow		Boston, Mass.
Blossburg, Corning & Tioga	A. H. Gorton	R. J. Burnham	Watkins, N. Y.
Brockville & Ottawa	H. Abbott		Brockville, Canada.
Burlington & Missouri River (in Neb.)	C. F. Morse	C. F. Morse	Plattsmouth, Neb.
Burlington, Cedar Rapids & Minnesota	William Greene	S. L. Dows	Cedar Rapids, Ia.
Buffalo, New-York & Philadelphia	J. D. Yeomans		Buffalo, N. Y.
Boston, Hartford & Erie	Wm. M. Parker		Boston, Mass.
Worcester Division	P. St. M. Andrews		Norwich, Ct.
Buffalo, Corry & Pittsburg	H. H. Potter	N. M. Whitside	Corry, Pa.

C

Camden & Atlantic	E. Collings		Camden, N. J.
Catasauqua & Fogelsville	C. W. Chapman	C. W. Chapman	Catasauqua, Pa.
Central Pacific	A. N. Towne	J. R. Watson	Sacramento, Cal.
Central Raiload of New-Jersey	R. E. Ricker	W. S Holden	Elizabeth, N. J.
Chesapeake & Ohio	A. H. Perry	J. A. Netherland	Richmond, Va.
Cheraw & Darlington	S. S. Solomon		Florence, S. C.
Cheshire & Ashuelot	R. Stewart	H. H. Stone	Keene, N. H.
Charlotte, Columbia & Augusta	James Anderson		Columbia, S. C.
Chicago & North-Western	Marvin Hughitt	R. W. Hamer	Chicago, Ill.
Wisconsin & Mill. Division	Arthur A. Hobert		Chicago, Ill.
Peninsula Division	S. C. Baldwin		Escanaba, Mich.
Madison Division	J. H. Stewart		Madison, Wis.
Kenosha Division	A. A. Hobart		Madison, Wis.
Galena Division	Edward J. Cuyler		Chicago, Ill.
Eastern Iowa Division	John B. Watkins		Clinton, Iowa.
Western Iowa Division	John A. Head		Boone, Iowa.
Chicago & Alton	J. C. McMullen	A. V. Hartwell	Chicago, Ill.
Chicago, Burlington & Quincy	R. Harris	H. J. Higgins	Chicago, Ill.
Eastern and Middle Division	C. H. Chappel		Aurora, Ill.
Galesburg Division	H. Hitchcock		Galesburg, Ill.
Quincy Division	N. D. Munson		Quincy, Ill.
Chicago, Dubuque & Minnesota	C. H. Hudson	F. T. Massey	Dubuque, Iowa.
Chicago, Rock Island & Pacific	Hugh Riddle.	A. Manvel	Chicago, Ill.
Illinois Division			Chicago, Ill.
Iowa Division	A. Kimball		Davenport, Iowa.
Chicago & Michigan Lake Shore	A. H. Morrison	Wm. R. Morrison	St. Joseph, Mich.
Chicago, Danville & Vincennes	J. E. Young	C. B. Mansfield	Chicago, Ill.
Cleveland, Columbus, Cincinnati & Ind.	E. S. Flint		Cleveland, Ohio.
Indianapolis Division	C. C. Gale	A. G. Wright	Indianapolis, Ind.
Columbus Division	Robert Blee		Cleveland, Ohio.
Cincinnati Division	R. H. Shoemaker		Cincinnati, Ohio.
Cleveland & Pittsburg	*J. N. McCullough		Pittsburg, Pa.
Cleveland, Mt. Vernon & Delaware	G. A. Jones		Akron, Ohio.
Cobourg, Peterboro & Marmora	James R. Barber	Jas. R. Barber	Cobourg, Can.
Cincinnati & Martinsville	T. C. Burnside		Franklin, Ind
Cincinnati & Terre Haute	Matt. P. Wood	Matt. P. Wood	Terre Haute, Ind.
Cin., Cumberland Gap & Charleston	W. J Taylor		Knoxville, Tenn.
Cincinnati, Hamilton & Dayton	Q. Williams	P. Hickey	Cincinnati, Ohio.
Cincinnati, Richmond & Chicago	Lewis Williams		Cincinnati, Ohio.
Cincinnati & Indianapolis Junction	M. M. Martin		Indianapolis, Ind.
Cincinnati & Muskingum Valley	C. C. Waite	C. C. Waite	Zanesville, Ohio.
Cincinnati, Lafayette & Chicago	E. H. Waldron	J. W. Haight	Lafayette, Ind.
Cincinnati, Sandusky & Cleveland		J. C. Buxton	Sandusky, Ohio.
Columbus & Hocking Valley	J. W. Doherty	J. W. Doherty	Columbus, Ohio.
Concord & Claremont	George E. Todd		Concord, N. H.
Concord	H. E. Chamberlin.	H. E. Chamberlin.	Concord, N. H.
Connecticut River	John Mulligan	John Mulligan.	Springfield, Mass.
Connecticut & Passumpsic Rivers	Emmons Raymond		Lyndonville, Vt.
Connecticut Western	W. H. Yeomans		Hartford, Ct.
Cumberland Valley	O. N. Lull	O. N. Lull	Chambersburg, Pa.
Cumberland & Pennsylvania	C. Slack		Mt. Savage, Md.

D

Danbury & Norwalk	John W. Bacon		Danbury, Ct.
Dakota Southern	J. S. Meckling	J. S. Meckling	Sioux City, Iowa.
Davenport & St. Paul	N. H. Wood		Urbana, Ill.
Dayton & Michigan	J. H. Weller		Dayton, Ohio.
Dayton & Union	C. C. Gale		Indianapolis, Ind.
Delaware	H. F. Kenney		Philadelphia, Pa.
Delaware & Hudson	R. Manville		Carbondale, Pa.
Delaware, Lackawanna & Western	W. F. Halstead	G. W. B. Cushing	Scranton, Pa.
Oswego and Syracuse Division	W. B. Phelps		Oswego, N. Y.
Utica, Chenango & Sus. "	George F. Thompson		Utica, N. Y.
Denver & Rio Grande	W. W. Borst	W. S. Jackson	Denver, Col.
Des Moines Valley	John Givin	G. E. Kilbourne	Keokuk, Iowa.
Detroit & Bay City	A. H. Reese		Detroit, Mich.
Detroit, Ft. Wayne & Logansport	W. A. Ernst		Jackson, Mich.
Detroit and Milwaukee	Andrew Watson	John S. Lorimer	" "
Detroit, Hillsdale & Indiana	H. C. Goodell	W. F. Parker	" "
Detroit, Eel River & Illinois	J. J. Grafton		Denver, Ind.
Detroit, Lansing & Lake Michigan	A. H. Reese		Detroit, Mich.
Dorchester & Delaware	D. Stewart Hessey.		Cambridge, Md.
Dunkirk, Alleghany Valley & Pittsburg	D. Thayer	C. V DeForest	New-York City.
Dubuque & South-Western	J. P. Farley		Dubuque, Iowa

E

East Alabama & Cincinnati	John M. Robinson		Baltimore, Md.
East Tennessee, Virginia & Georgia	Joseph Jaques		Knoxville, Tenn.
Eastern	J. Prescott	C. W. Pratt	Boston, Mass.
Eastern Shore	William Thompson		Princess Anne, Md.
Eastern Kentucky	J. McL. Straughton	George Gibbs	Riverton, Ky.
Elizabethtown & Paducah	D. Brock	D. Brock	Elizabethtown, Ky.
Erie	H. D V. Pratt	L. L. Lockwood	New-York, N.Y.
Eastern & Delaware Division	G. S. Redington		Port Jervis, N. Y.
Susquehanna & Rochester "	C. W. Gedner		Elmira, N. Y.
Western & Buffalo "	R. G. Taylor		Buffalo. N. Y.
European & North-American	M. H. Angel	M. H. Angell	Bangor, Maine.
Erie & Pittsburg	John M. Kimball.	Wm. Mullins	Erie, Pa.
Evansville & Crawfordsville	L. Pearson		Evansville, Ind.
Evansville, Terre Haute & Chicago	Jos. Collett, jr.		Terre Haute, Ind.

F

Fairhaven Branch	Warren Ladd		New-Bedford, Mass.
Fitchburg	Chas. L. Haywood.	John Adams.	Boston, Mass.
Flint & Pere Marquette	G. C. Kimball	G. C. Kimball	East-Saginaw, Mich.
Flushing & North-Side	R. D. Turner		Hunter's Point, L.I.
Fonda, Johnstown & Gloversville	Lawton Caten		Gloversville, N. Y.
Fort Wayne, Jackson & Saginaw	W. A. Ernst	Wm. F. Parker	Jackson, Mich.
Fort Wayne, Muncie & Cin	W. W. Worthington		Fort Wayne, Ind.
Freehold & Jamesburg Agricultural	I. S. Buckalew	I. S. Buckalew	Trenton, N. J.

G

Galveston, Harrisburg & San Antonio	Geo. B. Nichols	J. W. Pierce	Galveston, Texas.
Galveston, Houston & Henderson	George B. Nichols.		Galveston, Texas.
Georgia	S. K. Johnson		Augusta, Ga.
Gilman, Clinton & Springfield	S. H. Melvin		Springfield, Ill.
Grand Rapids & Indiana	*C. E. Gorham		Fort Wayne, Ind.
S. Division	J. M. Matheany		Fort Wayne, Ind.
N. Division	H. D. Wallen, jr		Grand Rapids, Mich.
Grand Rapids & Indiana		William Mullins.	Pittsburg, Pa.
Grand Trunk	C. J. Brydges	John Taylor	Montreal, Canada.
East Division	Henry Bailey		
West Division	W. J. Spicer		
Grand Tower and Carbondale	H. V. Olyphant.	Wm. W. Harris	Grand Tower, Ill.
Great Western	William K. Muir.	Robert Beatty	Hamilton, Canada
Green Bay & Lake Pepin	D. M. Kelly		Green Bay, Wis.
Greenville & Columbia	Thomas Dodamead		Columbia, S. C.

H

Hannibal & St. Joseph	O. S. Lyford		Hannibal, Mo.
Harlem Extension	F. C. White		Rutland, Vt.
Hartford, Providence & Fishkill	Samuel Nott		Hartford, Ct.
Housatonic	H. W. Franklin		Bridgeport, Ct.
Houston & Texas Central	J. Durand	W. M. Rice, N.Y.	Houston, Texas.
Southern Division	W. H. Vaughan		Houston, Texas.
Northern Division	M. R. Baldwin		Corsicana, Texas.
Houston Tap & Brazoria	S. Schoch		Houston, Texas.
Huntingdon & Broad Top	J. McKillips	B. A. Knight	Huntingdon, Pa.

I

Illinois Central	A. Mitchell	O. Ott	Chicago, Ill.
Chicago Division	C. A. Beck		Centralia, Ill.
Northern Division	J. C. Jacobs		Amboy, Ill.
Iowa Division	D. W. Parker		Dubuque, Iowa.
Illinois & St. Louis	W. K. McComas		St. Louis, Mo.
Indiana North & South	M. W. Cook		Attica, Indiana.
Indianapolis, Bloomington & Western	J. E. Gimperling		Urbana, Ill.
Indianapolis, Cincinnati & Lafayette	George L. Barringer.		Cincinnati, Ohio.
Indianapolis & Vincennes	E. W. McKenna.		Indianapolis, Ind.
Indianapolis & Vincennes		Wm. Mullins.	Pittsburg, Pa.
Indianapolis & St. Louis	S. Woodward	J. W. Morse.	St. Louis, Mo.
Indianapolis, Peru & Chicago	A. B. Southard	D. Macy.	Indianapolis, Ind.
Michigan City Division	E. C. Murphy		La Porte, Ind.
Intercolonial Railway	Lewis Carvell		Moncton, N. B.
International & Houston & Gt. Northern	H. M. Hoxie		Houston, Texas.
Iowa Midland	J. B. Watkins		Clinton, Iowa.

J

Jacksonville, North-Western & S. E.	E. S. Greenleaf		Jacksonville, Ill.
Jacksonville, Pensacola & Mobile	James M. Baker		Jacksonville, Fla.
Jefferson, Madison & Indianapolis	Horace Scott		Louisville, Ky.
Jefferson, Madison & Indianapolis	Wm. Mullins	R. J. Elvin	Jeffersonville, Ind.
Junction & Breakwater	John A. Sheaff		Lewis, Del.

K

Kansas Central	A. E. Buchanan.		Leavenworth, Kan.
Kansas City, St. Joseph & Council Bluffs	J. F. Barnard		Detroit, Mich.
Kent County & Queen Anns & Kent	C. H. Platt.		Chestertown, Md.
Kent County & Queen Anns & Kent	Jennings Hood.		Massey's Junc., Md.
Kansas Pacific	Edward S. Bowen		Kansas City, Mo.
Kansas Pacific		J. L. Woods	St. Louis, Mo.
Kaw Valley Division	George Noble		Lawrence, Kansas.
Smoky Hill Division	O. H. Dorrance		Ellis, Kansas.
Denver Division	C. W. Fisher		Denver, Col.
Kentucky Central	G. H. Pendleton.	Geo. P. Bowler	Covington, Ky.
King's Mountain	E. Thomas	F. M. Galbraith	Yorkville, S. C.
Knox & Lincoln	C. A. Combs	Oliver Morse	Bath, Maine.
Knoxville & Charleston	R. C. Morris		Knoxville, Tenn.
Knoxville & Ohio	M. J. Parrott		Knoxville, Tenn.

L

Lackawanna & Bloomsburg	D. T. Bound	G. W. B. Cushing	Kingston, Pa.
Lake Erie & Louisville	J. H. Burgoon		Fremont, Ohio.
Lake Ontario Shore	E. A. Van Horne		Oswego, N. Y.
Lake Shore & Tuscarawas Valley	W. W. Card		Cleveland, Ohio.
Lake Shore & Michigan Southern	Charles Paine	A. C. Armstrong.	Cleveland, Ohio.
Kalamazoo Division	William Wheaton		Kalamazoo, Mich.
Detroit Division			
Lansing Division			
Laurel Fork & Sand Hill	D. C. Mudge		Volcano, W. Va.
Leavenworth, Lawrence & Galveston	Chas. B. Peck	E. O. Foote, jr.	Lawrence, Kan.
Lawrence & South-Western	R. B. Gemmell	R. B. Gemmell	Lawrence, Kan.
Lehigh Valley	Robert H. Sayre.	L. Chamberlin (Philadelphia).	Bethlehem, Pa.
Beaver Meadow Division	A. G. Brodhead, jr		Mauch Chunk, Pa.
Mahony Division	James I. Blakslee		Mauch Chunk, Pa
Wyoming Division	A. Mitchell		Wilkesbarre, Pa.
Lewisburg Centre & Spruce Creek	Frank Thompson		Lewisburg, Pa.
Lexington & Big Sandy	W. F. Gaylord		Ashland, Ky.
Little Rock & Fort Smith	Asa Hodges		Little Rock, Ark.
Logansport, Crawfordsville & S. W.	E. C. Dawes		Cincinnati, Ohio.
Long Island	Jno. B. Morford	Oliver Charlick	Hunter's Point, L. I.
Louisville & Nashville & G. Southern	Albert Fink	G. C. Breed	Louisville, Ky.
Clarksville Division	Robert Meek		Clarksville, Tenn.
Memphis Division	J. T. Flynn		Memphis, Tenn.
Nashville & Decatur Division	D. F. Whitcomb		Nashville, Tenn.
Louisville, Cin. & Lexington	George Skinner	Geo. Skinner	Louisville, Ky.
Louisville, New-Albany & Chicago	M. Sloat	J. R. Parker	New-Albany, Ind.

M

McMinnville & Manchester	W. S. Huggins		McMinnville, Tenn.
Macon & Brunswick	William McRae	Solomon Hass	Macon, Ga.
Macon & Western	G I. Foreacre		Savannah, Ga.
Madison & Portage	H. C. Atkins		Madison, Wis.

Maine Central	L. L. Lincoln	G. A. Phillips	Augusta, Me.
Androscoggin Division	A. Brown.		Lewiston, Me.
Manchester & Lawrence	H. E. Chamberlin		Concord, N. H.
Marietta & Cincinnati	W. W. Peabody		Cincinnati, Ohio.
Marietta & Pittsburg	A. J. Warner	R. B. Hoover	Marietta, Ohio.
Marquette, Houghton & Ontonagon	*S. L. Smith	C. E. Van Cleve	Marquette, Mich.
Maryland & Delaware	J. L. Caldwell	J. L. Caldwell	Easton, Md.
Memphis, Carthage & North-Western	George A. Burt		Carthage, Mo.
Memphis & Little Rock	A. S. Livermore.		Memphis, Tenn.
Memphis & Charleston	W. J. Ross		Memphis, Tenn.
Michigan Central	H. E. Sargent.		Chicago, Ill.
Michigan Central		John Newell	Detroit, Mich.
Grand River Valley Division	Charles B. Bush		Grand Rapids, Mich.
Jackson, Lansing & Saginaw Div.	Geo. C. Hopper		Saginaw City, Mich.
South-Haven Division	Geo. E. Curtiss		Kalamazoo, Mich.
Joliet Division	C. Knowlton		Joliet, Mich.
South-Bend Division			
Michigan Lake Shore	Chas. E. Gorham		Fort Wayne, Ind.
Michigan Lake Shore	P. S. O'Rourke		Monteith, Mich.
Midland Railway of Canada	H. G. Taylor		Port Hope, Ont.
Middleburg & Schoharie & S. Valley	P. S. Danforth		Middleburg, N. Y.
Middleboro & Taunton	A. E. Swasey		Taunton, Mass.
Midland Pacific	J. N. Converse		Lincoln, Neb.
Milwaukee & Northern	J. W. Crippin		Milwaukee, Wis.
Milwaukee, Lake Shore & Western	W. Elwell		Sheboygan, Wis.
Western Division	J. S. Buck		Appleton, Wis.
Mineral Point	G. W. Cobb.		Mineral Point, Wis.
Mississippi Central	R. N. Colquhoun.		Water Valley, Miss.
Mississippi Central		A. S. Roberts	New-Orleans, La.
Mississippi & Tennessee	M. Burke	M. Burk	Memphis, Tenn.
Mississippi Valley & Western	E. P. Buell		Quincy, Ill.
Missouri, Iowa & Nebraska	Col. Henry Hill		Warsaw, Ill.
Missouri, Kansas & Texas	W. R. Woodward	G. M. Babcock	Sedalia, Mo.
Cherokee Division	W. H. Adams		Chetopa, Kansas.
Choctaw Division	S. G. Eddy		Holden, Mo.
Sedalia Division	J. J. Frey.		Sedalia, Mo.
Neosho Division	L. S. Hamilton		Neosho Falls, Kan.
Missouri Pacific	A. A. Talmage	W. H. Patriarche.	St. Louis, Mo.
Missouri River, Fort Scott & Gulf	B. S. Henning	Allen Bowen	Kansas City, Mo.
Mobile & Alabama, G. T			
Mobile & Ohio	L. J. Fleming	C. E. Rushing	Mobile, Ala.
	Cecil Fleming.		Mobile, Ala.
	E. S. Hosford		Macon, Miss.
	M. M. Miller.		Jackson, Tenn
Mobile & Girard	W. L. Clark		Columbus, Ga.
Mobile & Montgomery	G. Jordon	G. Jordon	Montgomery, Ala.
Monadnock	H. C. Goulding		Peterboro, N. H.
Montgomery & Eufaula	B. Dunham	B. Dunham	Montgomery, Ala.
Monticello	Anson Wood		Urbana, Ill.
Morgan's Louisiana & Texas		C. A. Whitney & Co.	New-Orleans, La.
Morris & Essex	Andrew Reasoner		Hoboken, N. J.
Muncy Creek	H. R. Merhling		Hughesville, Pa.

N

Nashville, Chattanooga & St. Louis	J. W. Thomas		Nashville, Tenn.
Naugatuck	G. W. Beach		Bridgeport, Ct.
New-Brunswick & Canada	J. P. Crangle	Thomas Williams	St. Stephen, N. B.
New-Bedford & Taunton	Warren Ladd		New-Bedford, Mass.
New-Canaan	Samuel St. John		New-Canaan, Ct.
New-Haven & Northampton	C. N. Yeamans	C. N. Yeamans	New-Haven, Ct.
New-Haven, Middletown & Willimantic	W. A. Waterbury.	W. A. Waterbury	Middletown, Ct.
New-Jersey Southern	W. S. Sneden		Long Branch, N. J.
New-Jersey West Line	J. B. Bassinger		Newark, N. J.
New-Orleans & Selma	T. H. DuPuy		Selma, Ala.
New-Orleans, Jackson & Great Northern	L. H. Sellars	A. S. Roberts	New-Orleans, La.
New-Orleans, Mobile & Texas	S. N. Scranton		New-Orleans, La.
New-York & Harlem	Chas. M. Bissell	R. C. Moore	New-York, N. Y.
New-York, New-Haven & Hartford	E. M. Reed	R. N. Dowd	Hartford, Ct.
N. Y. & N. H. Division	John T. Moody		New-York, N. Y.
Hartford Division	C. S. Davidson		Hartford, Ct.
New-York, Boston & Montreal	C. L. Kimball		Dutchess Jn., N. Y.
New-York Central & Hudson River	J. Tillinghast	C. V. DeForest	Albany, N. Y.
Eastern Division	Zenas C. Priest		Utica, N. Y.
Syracuse & Rochester Division	W. G. Lapham.		Syracuse, N. Y.
Buffalo & Rochester Division	M. W. Torrence		Buffalo. N. Y.
New-York & Oswego Midland.	C. W. Douglas	P. Bundy	Jersey City, N. J.
Northern Division	W. P. McKinley.		Oswego, N. Y.
New-York, Kingston & Syracuse	H. P. Breed.		Rondout, N. Y.
Northern Pacific	*C. W. Mead.		Brainerd, Minn.
Minnesota Division	J. H. Sullivan		Duluth, Minn.
Lake Superior & Miss. Division	W. W. Hungerford		St. Paul, Minn.
North-Louisiana & Texas	J. W. Green.		Monroe, La.
North-Pennsylvania	S. W. Roberts	F. A. Cornby	Philadelphia, Pa.
Northern Canada	†F. W. Cumberland		Toronto, Can.
Northern Central	Alfred R. Fiske.		Harrisburg, Pa.
Northern (New-Hampshire)	George E. Todd.		Concord, N. H.
North-Eastern (South-Carolina)	S. S. Solomon		Charleston, S. C.
North-Wisconsin	A. H. Baldwin		Hudson, Wis.

O

Ohio & Mississippi	E. L. Ryder.		Cincinnati, Ohio.
Oil Creek & Alleghany River	J. J. Lawrence		Pittsburg, Pa.
Old Colony	J. R. Kendrick		Boston, Mass.
Omaha & North-Western	R. R. Cable		Rock Island, Ill.
Oregon & California	H. Thielson.	G. W. Weidler	Portland, Oregon.
Owensboro & Russellville	Edmund Turner		Owensboro, Ky.

P

Paducah & Memphis	J. W. Wilber.		Paducah, Ky.
Painesville & Youngstown	J. C. Sharpless.		Painesville, Ohio.
Paris & Danville	B. F. Matthius		Danville, Ill.
Paris & Decatur	F. C. Stratton	P. Campbell.	Paris, Ill.
Peninsula	C. F. Miller.		Battle Creek, Mich.
Pennsylvania	* A. J. Cassatt	Enoch Lewis.	Philadelphia, Pa.
New-York Division	F. W. Jackson		Jersey City, N. J.
Amboy Division	Isaac S. Buckalew		Trenton, N. J.
Belvidere Division	J. A. Anderson		Lambertville, N.J.
Western Pennsylvania Division	Robert Neilson		Blairsville, Pa.
Lewiston Division	Persifer F. Smith		Lewiston, Pa.
Bedford Division	Wm. H. Brower		Bedford, Pa.
Pensacola & Louisville	Daniel H. Cram.		Pensacola, Fla.
Peoria & Rock Island	John R. Hilliard		Peoria, Ill.
Peoria, Pekin & Jacksonville	James F. Kelsey		Pekin, Ill.
Petersburg	* Jas. C. Sprigg	D. R. Dunn	Petersburg, Va.
Philadelphia & Reading	J. E. Wootten	W. S. Wilson	Reading, Pa.
Catawissa & Williamsport Br'ch	George Webb		Williamsport, Pa.
Reading & Columbia	B. Van Lew		Columbia, Pa.
Lebanon & Tremont	H. W. Tracy		Pine Grove, Pa.
Philadelphia and Baltimore Central	Henry Wood	Henry Wood	Philadelphia, Pa.
Philadelphia & Erie	W. A. Baldwin	E. Lewis	Erie, Pa.
Western Division	J. W. Reynolds		Erie, Pa.
Middle Division	Edmund L. Tyler		Renovo, Pa.
Eastern Division	Thomas Gucker		Williamsport, Pa.
Philadelphia, Wilmington & Baltimore	H. F. Kenney		Philadelphia, Pa.
Pithole Valley	J. T. Blair		Pithole City, Pa.
Pittsburg, Cincinnati & St. Louis	*J. N. McCullough	Wm. Mullins.	Pittsburg, Pa.
Pittsburg & Cin. Division	Hugh Pitcairn		Pittsburg, Pa.
Little Miami Division	J. D. Ellison.		Cincinnati, Ohio.
Indianapolis & C. Division	D. W. Caldwell		Columbus, Ohio.
Pittsburg, Washington & Baltimore	E. K. Hindman		Pittsburg, Pa.
Pittsburg, Ft. Wayne & Chicago	*J. N. McCullough	Wm. Mullins.	Pittsburg, Pa.
Eastern Division	Richard Wiggin		Pittsburg, Pa.
Western Division	C. D. Gorham		Fort Wayne, Ind.
Port Royal	S. C. Millett		Port Royal, S. C.
Port Huron & Lake Michigan	W. L. Bancroft		Port Huron, Mich.
Portland & Ogdensburg	J. Hamilton	John E. Donnell	Portland, Maine.
Portland & Oxford Central	F. B. Smith		Canton, Maine.
Portland & Rochester	W. H. Turner	W. H. Turner	Portland, Maine.
Portland, Saco & Portsmouth	Francis Chase		Portland, Maine.
Portsmouth, Great Falls & Conway	A. A. Perkins		Portsmouth, N. H.
Portsmouth	H. E. Chamberlin		Concord, N. H.
Port Whitby & Port Perry	B. R. Kimball		Whitby, Can.
Poughkeepsie & Eastern	J. A. Perkins	A. W. Cable	Poughkeepsie, N Y.
Providence & Worcester	W. D. Hilton	W. D. Hilton	Providence, R. I.
Providence, Warren & Bristol	Waterman Stone		Providence, R. I.

Q

Quincy, Alton & Illinois	N. D. Munson		Quincy, Ill.
Quincy, Missouri & Pacific	John N. Schermerhorn		Quincy, Ill.
Queen Anns & Kent	Jennings Hood		Centreville, Md.

R

Raleigh & Gaston	A. B. Andrews	A. B. Andrews	Raleigh, N. C.
Rensselaer & Saratoga	Henry B. Smith		Troy, N. Y.
Richmond & York River	W. N. Bragg	Hugh Graham	Richmond, Va.
Richmond & Danville	T. M. R. Talcott.		Richmond, Va.
Richmond, Fred. & Potomac	E. T. D. Myers	T. L. Courtney.	Richmond, Va.
Richmond & Petersburg	R. L. Stainback.		Richmond, Va.
Rockford, Rock Island & St. Louis	R. R. Cable		Rock Island, Ill.
Rockville	A. H. Putnam		Rockville, Ct.
Rome, Watertown & Ogdensburg	J. W. Moak		Watertown, N. Y.

S

St. Lawrence & Ottawa	R. Luttrell		Prescott, Can.
St. Joseph & Denver City	L. D. Tuthill		St. Joseph, Mo.
St. Paul & Pacific	E. Q. Sewell	E. C. Becker	St. Paul, Minn.
St. Paul & Sioux City	J. F. Lincoln.		St. Paul, Minn.
St. Louis, Alton & Terre Haute	W. G. Broughton		St. Louis, Mo.
St. Louis & Iron Mountain	Arthur W. Soaper.	W. S. Cuddy	St. Louis, Mo.
St. Louis & South-Eastern	*E. F. Winslow	C. W. Gardiner	St. Louis, Mo.
St. Louis Division	George S. Winslow		Mt. Vernon, Ill.
Nashville Division	H. L. Morrill		Henderson, Ky.
St. Louis, Kansas City & Northern	W. C. Van Horne	R. W. Green	St. Louis, Mo.
St Louis Division	J. L. Hinkley		St. Louis, Mo.
St. Louis, Vandalia, Terre Haute & Ind.	John E. Simpson.		Indianapolis, Ind.
St. Louis, Vandalia, Terre Haute & Ind.	Chas. R. Peddle		Terre Haute, Ind.
Sacramento Valley & P. & S. V.	F. A. Bishop		Sacramento, Cal.
Saginaw Valley & St. Louis	J. B. Gillett	J. B. Gillett	Saginaw, Mich.
San Francisco & Northern Pacific			
Savannah & Charleston	C. S. Gadsden		Charleston, S. C.
Seaboard & Roanoke	J. B. Pendleton	J. A. Walton	Baltimore, Md.
Selma, Marion & Memphis	J. P. Fresenius		Marion, Ala.
Selma & Gulf			
Selma, Rome & Dalton	E. G. Barney		Patona, Ala.
Sheboygan & Fond du Lac	Brandon Mozley	Brandon Mozley	Fond du Lac, Wis.
Shenango & Allegheny	G. H. McKibbin		Greenville, Pa.
Sioux City & Pacific	L. Burnett	L. Burnett	Missouri Valley, Ia.
Sodus Point & Southern	F. A. Bassler		Sodus Point, N. Y.
South-Shore	J. R. Kendrick.		Boston, Mass.
South & North-Alabama	D. F. Whitcomb		Nashville, Tenn.
South-Side, Long Island			
South-Carolina		A. Mitchell	Charleston, S. C.
Southern Central	James G. Knapp		Auburn, N. Y.
Southern Minnesota	*H. W. Holley		Wells, Minn.
Southern Pacific of California	A. N. Towne		Sacramento, Cal.
South-Mountain Iron Co.	S. W. Weaver		Mt. Creek, Cumb. Co., Pa.
Spartanburg & Union	Thomas P. Jeter		Unionville, S. C.
Springfield & North-Western	*A. J. Ware		Pekin, Ill.
Springfield & Ill. South-Eastern.	G. W. Norris		Springfield, Ill.
Staten Island	J. W. Wilbur		New-York, N. Y.
Stonington & Providence	A. S. Mathews	A. S. Mathews	Stonington, Ct.
Sullivan & Erie	R. A. Packer		Towanda, Pa.
Syracuse Northern	C. B. Morse	C. B. Morse	Syracuse. N. Y.
Syracuse, Binghamton & New-York	T. Voorhees	G. W. B. Cushing	Syracuse, N. Y.

T

Tennessee & Pacific	George Maney		Nashville. Tenn.
Texas & New-Orleans	R. B. Baer		Houston. Texas.
Toledo, Peoria & Warsaw	W. H. Cruger	J. A. Winner	Peoria, Ill.
Western Division	David K. Smith		Peoria, Ill.
Western Division	William E. Dorwin		Warsaw, Ill.
Toledo, Wabash & Western	Geo. H. Burrows	J. J. Nessle	Toledo, Ohio.
Eastern Division	C. W. Bradley		Lafayette, Ind.
Western Division	D. A. Collins		Lafayette, Ind.
Ohio Division	H. F. Clark		Toledo, Ohio.
Troy & Boston	C. W. Moseley		Troy, N. Y.
Toronto, Grey & Bruce	N. Weatherston	W. Watson	Toronto, Can.
Toronto & Nipissing	J. C. Bailey		Toronto.
Tuckerton	J. Naramore		Tuckerton, N. J.

U

Union Pacific	T. E. Sickles	T. E. Sickles	Omaha, Neb.
Mountain Division	S. J. Nichols		Cheyenne, Wyom'g.
Laramie Division	S. T. Shankland		Laramie, Wyoming.
Western Division	O. H. Earll		Evanston, Ill.
Utah Central & Southern	John Sharp	S. H. Hill	Salt Lake City.
Utica & Black River	T. W. Spencer		Utica, N. Y.
Utica, Ithaca, & Elmira	H. P. Goodrich		Ithaca, N. Y.

V

Vermont & Mass. & Troy & G	O. T. Ruggles	O. T. Ruggles	Fitchburg, Mass.
Vermont Central	Gyles Merrill		St. Albans, Vt.
Western Division	John Schrier		Ogdensburg, N. Y.
Central & Southern Division	Ambrose Arnold		St. Albans, Vt.
Northern & Eastern Division	G. L. Stone	"	"
Rutland Division	J. Burdett		Rutland, Vt.
New-London Northern	G. T. Benedict		New-London, Ct.
Vicksburg & Brunswick	Virgil Powers	H. Young	Eufaula, Ala.
Vicksburg & Meridian	E. F. Raworth		Vicksburg, Miss.

W

Washington & Ohio	R. H. Havener	Lewis McKenzie.	Alexandria, Va.
Welland	William Pay		St. Catherine. Ont.
Wellsboro & Lawrenceville	A. H. Gorton		Corning, N. Y.
Westchester & Philadelphia	Henry K. Smith	J. J. Bryant.	Philadelphia, Pa.
West-Wisconsin	J. H. Hull		Hudson, Wis.
West-Jersey	W. J. Sewell		Camden, N. J.
Western of North-Carolina	John M. Rose		Fayetteville, N. C.
Western & Atlantic	Wm. McRae		Nashville, Tenn.
Western Maryland	John T. Rigney	John T. Rigney	Baltimore, Md.
Western Union	D. A. Olin	R. Wason	Racine, Wis.
White Water Valley	H. M. Britton	H. M. Britton	Cincinnati, Ohio.
Wilmington & Western	M. C. Conwell		Wilmington, Del.
Wilmington, Columbia & Augusta	James Anderson.	James Anderson.	Wilmington, N. C.
Wilmington & Weldon	J. F. Devine		Atlanta, Ga.
Wilmington, Charlotte & Rutherford	S. L. Fremont		Wilmington, N. C.
Wilmington & Reading	C. Stoltz	C. Stoltz	Coatesville, Pa.
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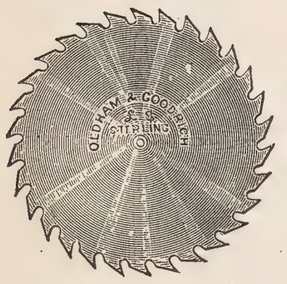

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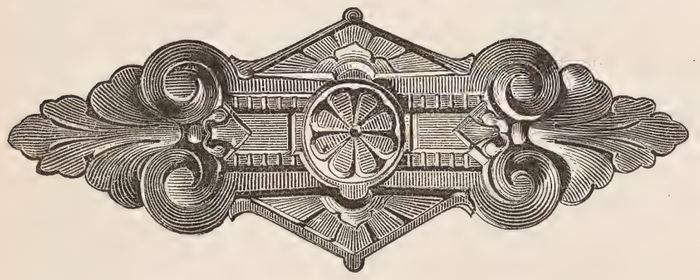

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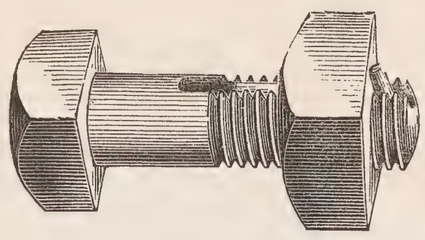
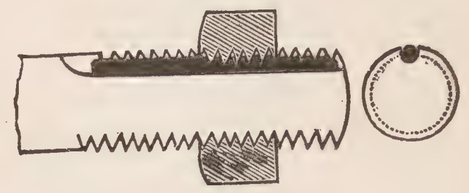


"CUMMING NUT-LOCK,"
Patented
June 16, 1868,
August 23, 1870.



SECTIONS.

Unequaled for CHEAPNESS, SIMPLICITY & EFFECTIVENESS.

This simple device, as will be seen by the engravings, consists of a groove being cut in the threaded part of a screw bolt into which is placed a key of copper wire, or other soft metal; when the nut is screwed on, it cuts a thread on the key, thereby making it impossible for the key to get out until the nut is taken off. When the nut is screwed up to its place, that part of the key over which the nut has passed is riveted up against the nut with a small punch, destroying the thread on the key. The nut, therefore, can not move backward until force is used, as with a wrench.

The groove can be rapidly cut with a simple machine designed for the purpose.

Experience has proved this device absolutely reliable, and it is the cheapest of all known devices for the purpose. By its use, old bolts on which the nuts have become too slack for use can be made as good as new, making it a great saving to railroad companies and others in that item alone. It is cheaper than a check-nut.

If the bolt should become slack from shrinking of timber or other causes, *the nut will always remain firmly attached to the bolt*, and, with the wrench, can be screwed up *any distance*, and the wire riveted up any number of times, or can be taken off without injury to the nut or bolt.

This is the only method in use that locks the nut firmly to the bolt without regard to place or surroundings, all others require some attachment that holds the bolt in its position, and a washer or other attachment to keep the nut from turning.

DIRECTIONS FOR USE.—Place the copper key in the slot, pointed end out, and beveled side up, in such a position that when the nut is screwed to its place about three-eighths of an inch of the key will project beyond its outer face. Then screw the nut to its place *over the key*, allowing it to cut its own thread in the copper. Then take a narrow flat set punch, and rivet the projecting part of the key *solidly* against the outer face of the nut. To tighten the nut: screw it up, and rivet the key tighter. To remove the nut: simply apply the wrench and unscrew the nut. It will cut its own way out through the copper. The same key can be used several times, by moving it outward a few threads in the slot.

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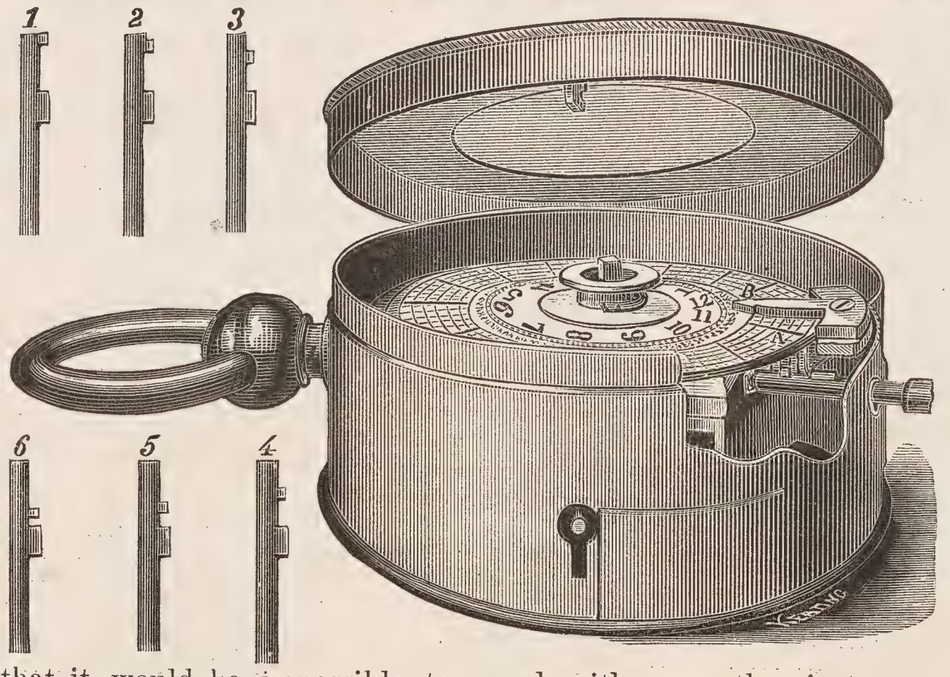

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The instrument is complete in itself, portable, and as reliable as the best lever watch.

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☞ This Detector is covered by two United States Patents. Parties using or selling these instruments, without authority from me, will be dealt with according to law. Address,

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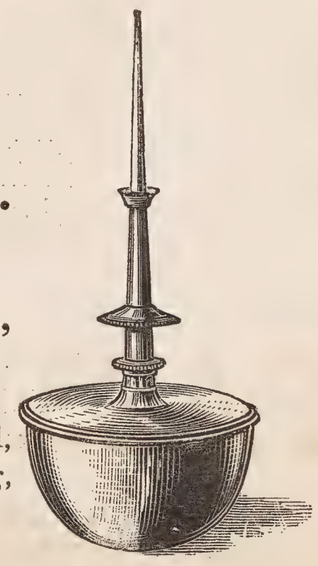

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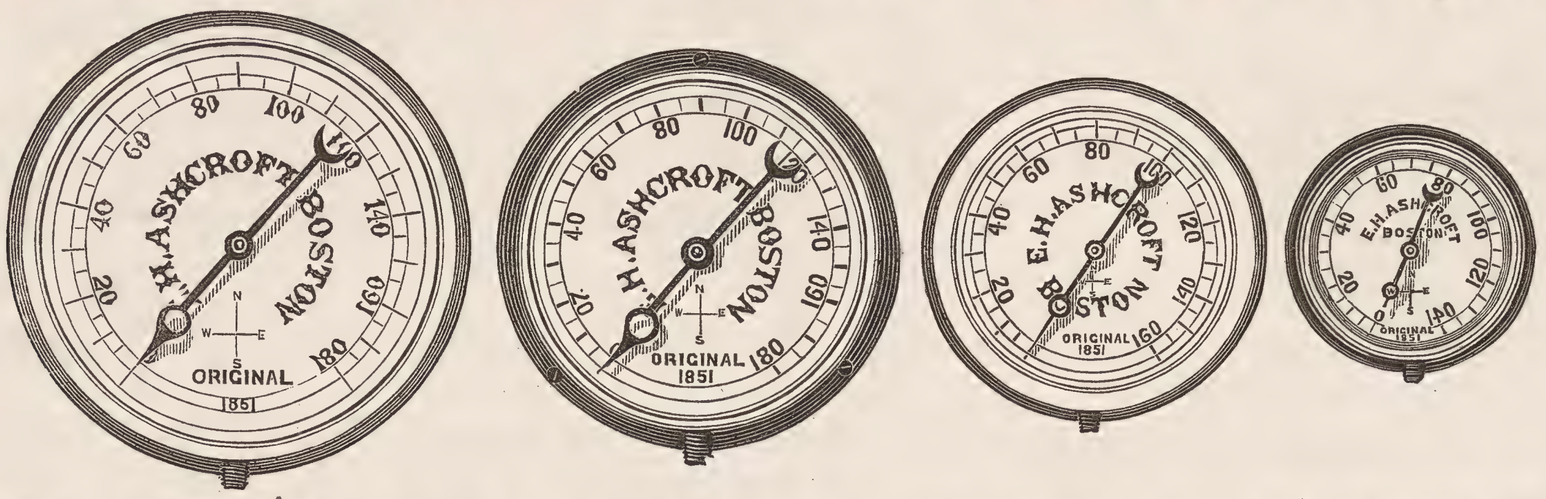

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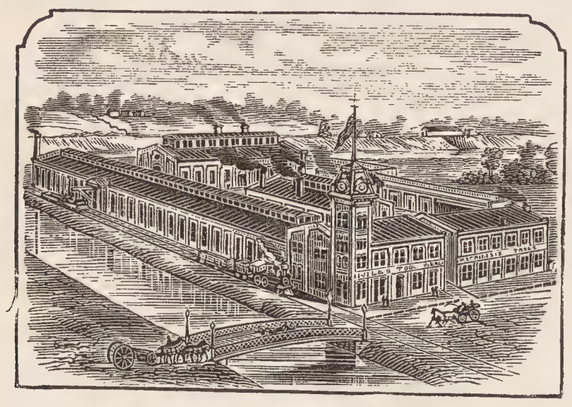

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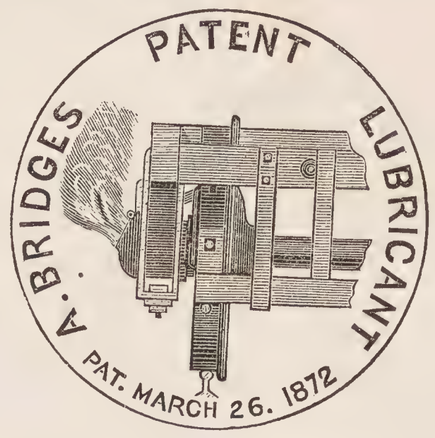

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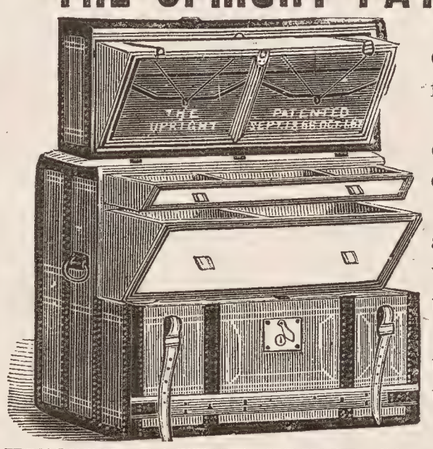

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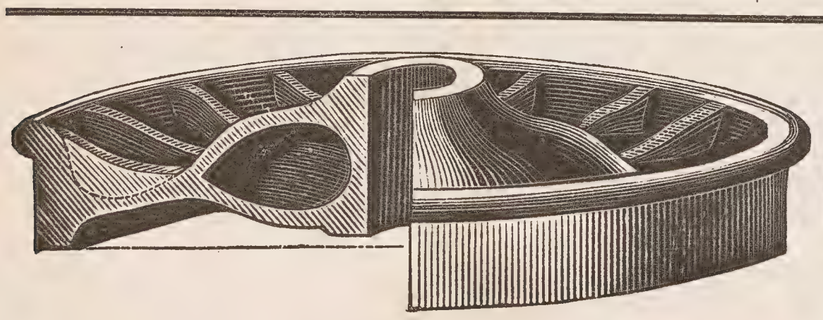

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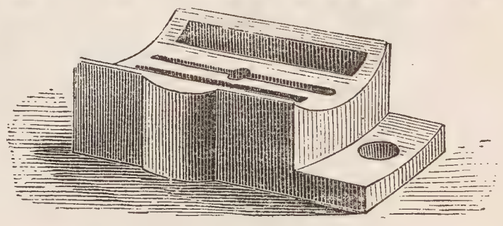

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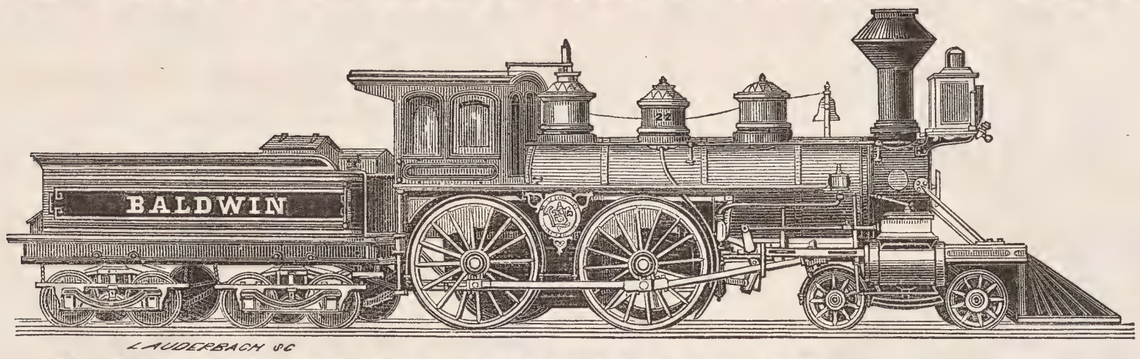

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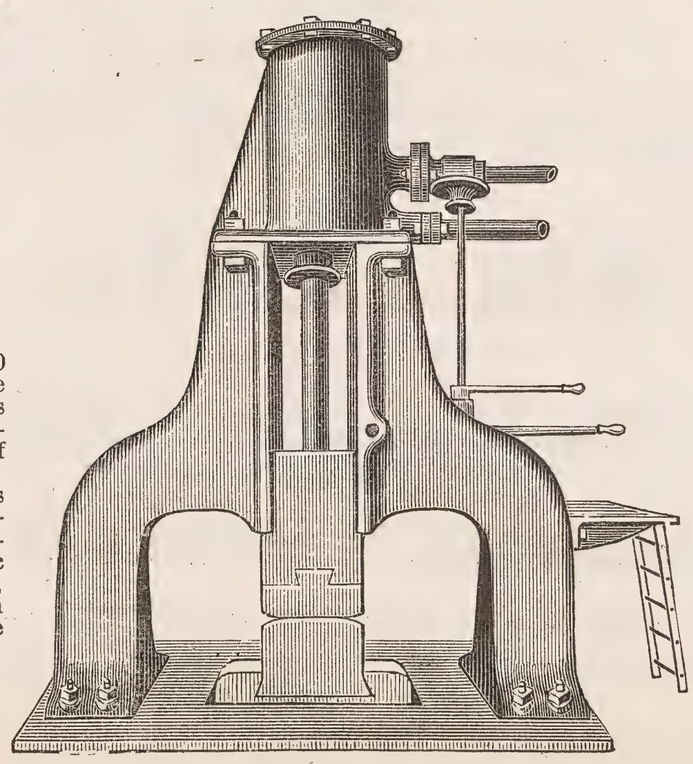

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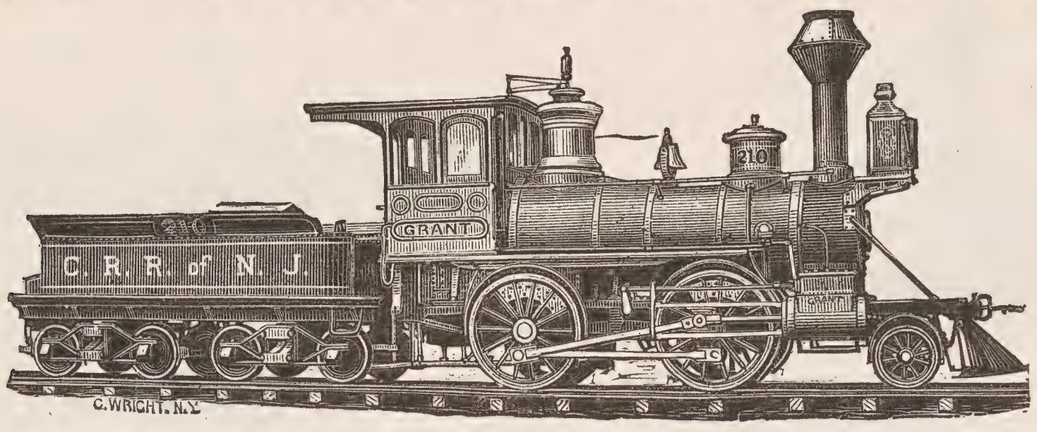

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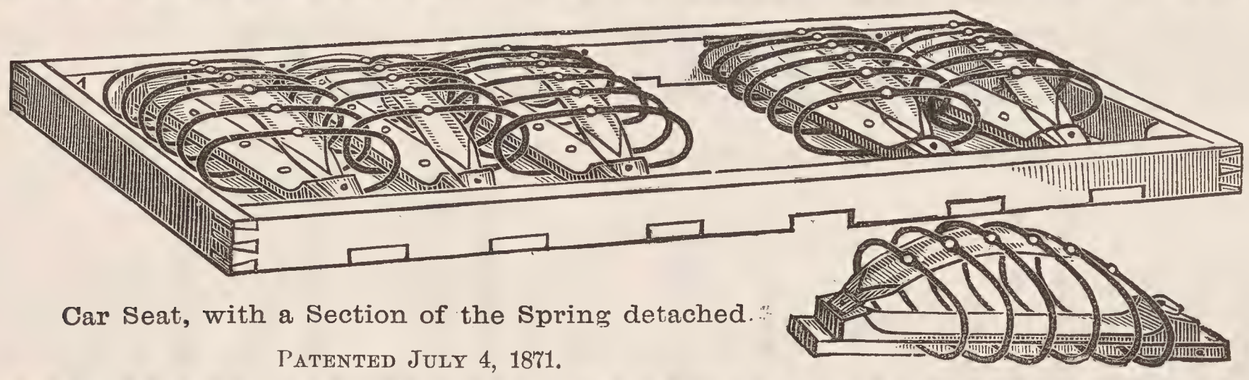

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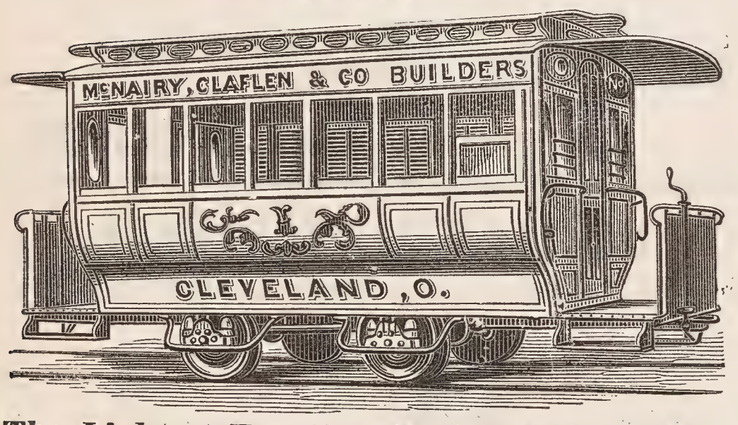

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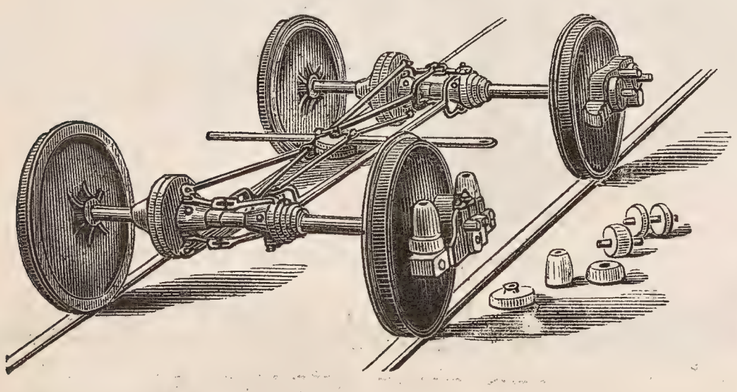

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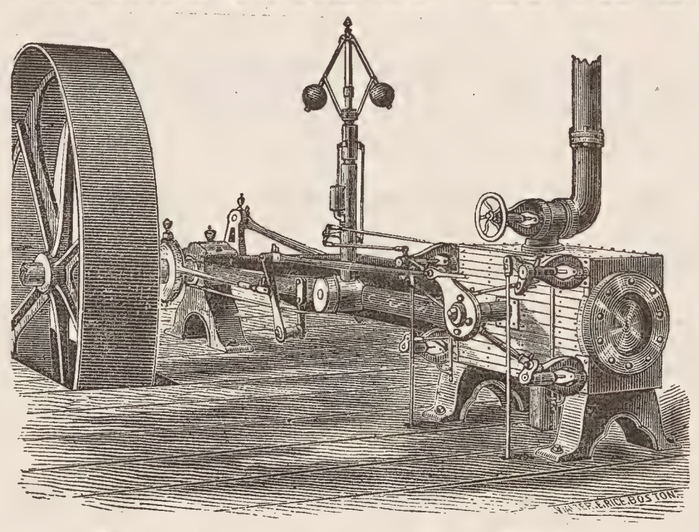

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In consequence of the large and increased demand for our "CAR HEAD LININGS," we have been obliged to remove our Manufactory from WORCESTER, MASS., to NEW-HAVEN, CONN., where new and commodious buildings have been erected, with increased conveniences for promptly supplying our Customers, and we beg to invite your attention to our new and SUPERIOR FACILITIES for furnishing

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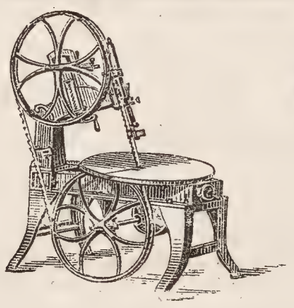

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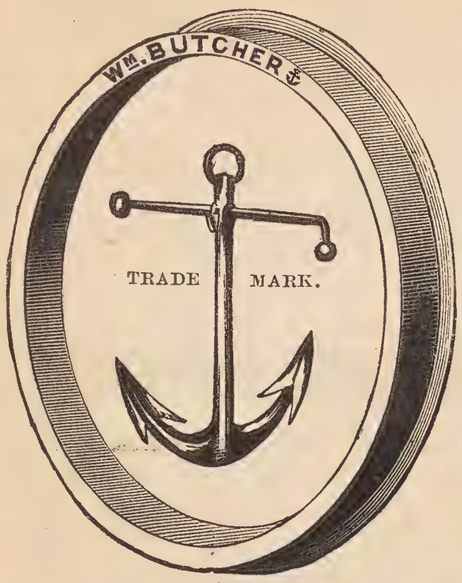

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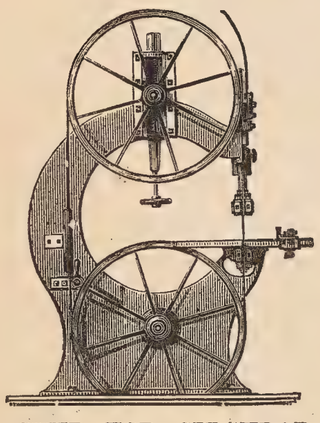

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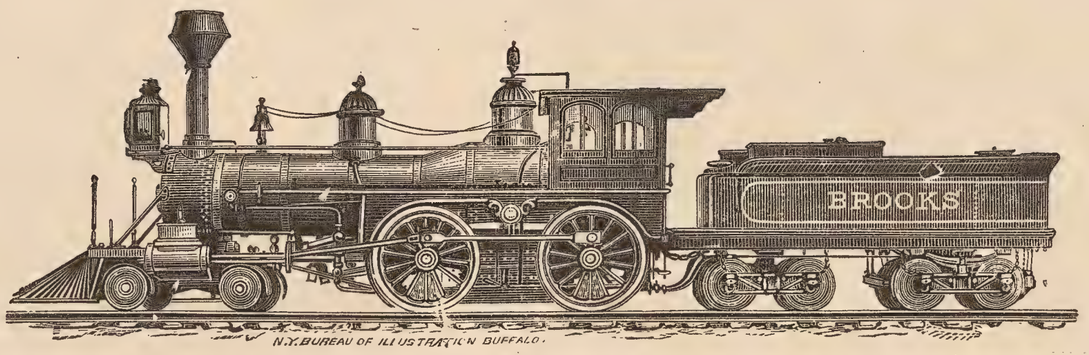

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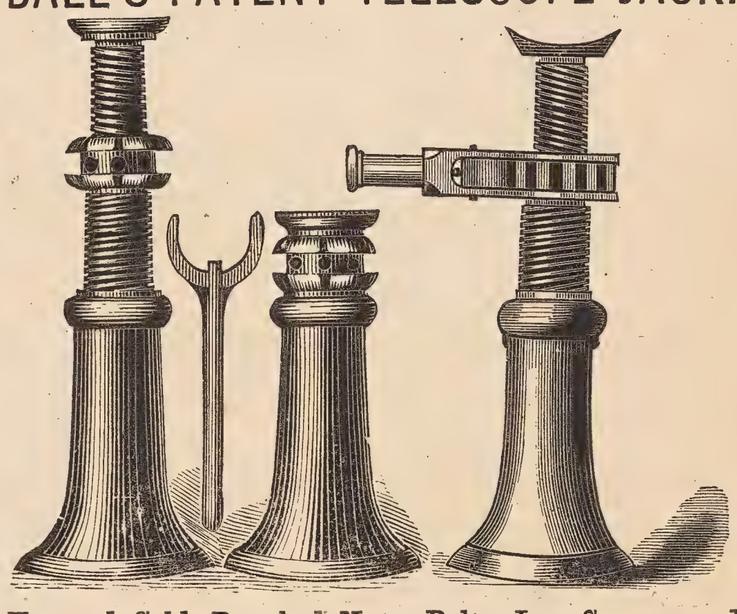

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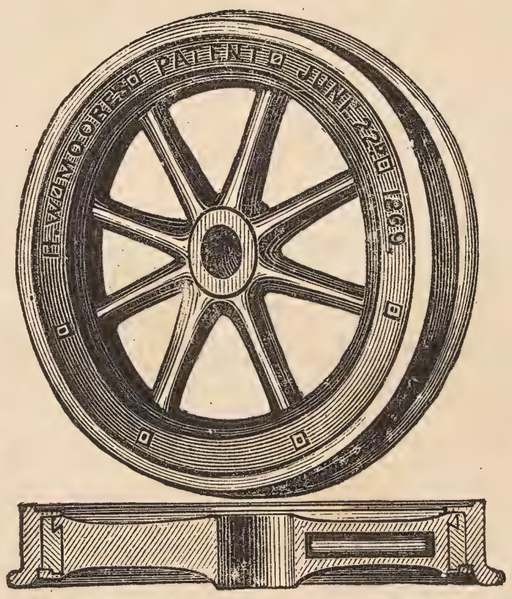

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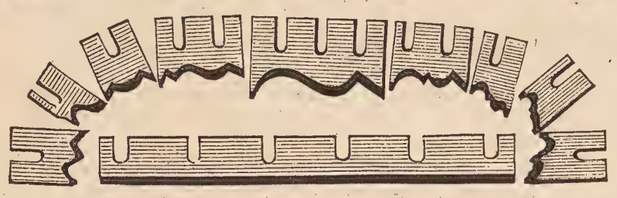

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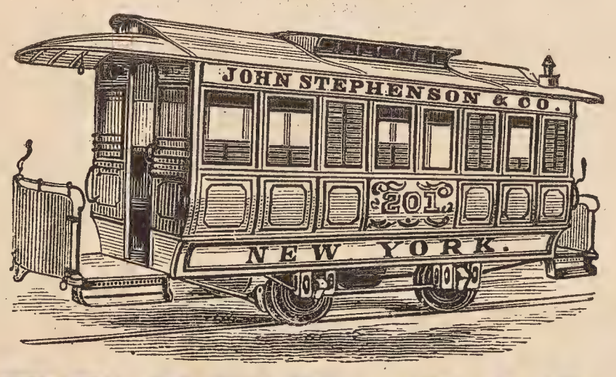

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Cold drafts around car windows and doors in Winter **ENTIRELY EXCLUDED;** also, **Dust** and **Cinders** in Summer by **BROWNE'S** Metallic **RUBBER** Window and Door Bands. Stood the test **10 YEARS** on Drawing-Room and Sleeping Cars in the United States and Europe.

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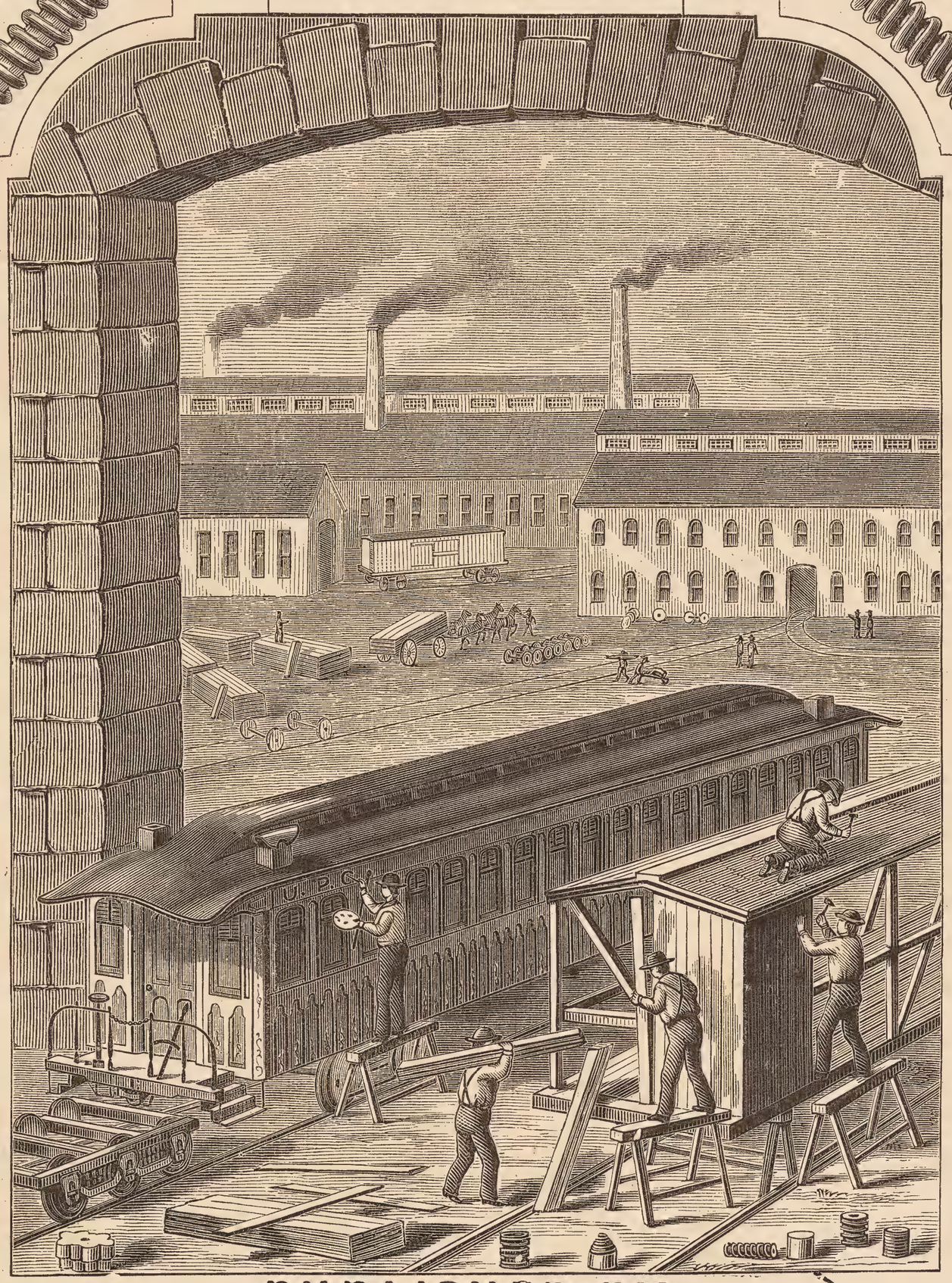

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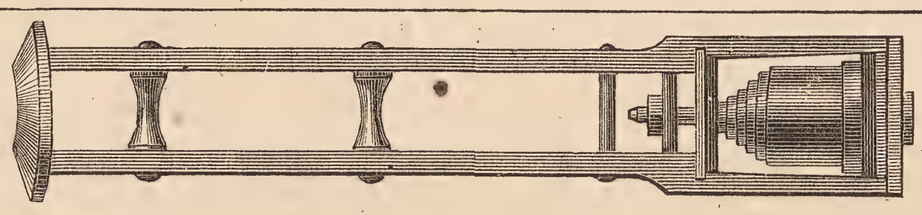

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LAWSON VALENTINE.
HENRY C. VALENTINE.

OFFICE: NEW-YORK.
FACTORY: BROOKLYN.

MAY 1, 1873.

FINISHING.

FREQUENT WASHING WITH COLD WATER WILL IMPROVE ITS LUSTRE AND HASTEN ITS HARDENING.

		PER GALLON.
Railway Body Varnish, . . . *(For finishing-coats on outside of Cars.)*	This Varnish differs from the Finishing Body Varnish used on carriages, in hardening free from tack more quickly, thereby rendering it more effectual in resisting cinders and dust. It is very pale, and dries out of the way of dust in about twelve hours. In working, fulness, lustre, and durability, it is unsurpassed. On old work, one, or at the most, two coats are sufficient. On new work, it is economy to use two or more coats over our **Hard Drying Body.**	$5 50

RUBBING.

Hard Drying Body Varnish, . *(For under-coats outside, and finishing inside, also for finishing Locomotives.*	This Varnish dries in eight to ten hours, and hardens so as to rub well in about four days. It is fully equal to our **Railway Body** in paleness, fulness, and lustre, and is much used for finishing over a leveled surface on hurried work not requiring the greatest durability. For best inside work it is particularly adapted.	5 00
Quick Leveling Varnish, . . . *(For under-coats on Locomotives and inside work, or for quickening the Hard Drying Body and Railway Body.*	This Varnish dries quicker and harder than our **Hard Drying Body.** In good weather it will harden so as to rub well in two days without sweating out. It is sufficiently pale for any light work. On outside work it should be protected with our **Railway Body.**	4 00

MISCELLANEOUS.

No. 1 Black Varnish, ... *(For smoke-stacks and other iron work.)*	This is an Elastic Black Varnish for Smoke-stacks. It dries and wears well. A little **Railway Body** mixed with it will improve it in lustre and durability.	1 50
Japan Gold-Size, ... *(For binding, drying, and hardening colors.)*	This is a superior oil-drier, of light color, and strength nearly double that of ordinary Japan. On account of its paleness and the less quantity required, it is especially valuable for use with light paints, and being an oil-drier it is much less hurtful to the work than Japan. Once known, it is indispensable to Car-Painters, for binding colors, mixing roughstuffs, and facilitating their drying and hardening through.	3 50
Crown Coach Japan, ... *(For drying and hardening paints.)*	This is a light-colored, strong-drying shellac Japan, for hardening colors, and is well adapted to the use of the car-painter.	1 75
Ground Roughstuff, ... *(For producing a hard and level surface on bodies of Cars.)*	This is a mixture of mineral substances, combined with great care so as to furnish a dense body with a sharp grit. It is ground in **Japan Gold-Size,** and is superior to all other roughstuffs, (sometimes erroneously called "fillings.") When used over a priming of one coat of **Permanent Wood-Filling,** the first coat should be made elastic with raw oil, and the following coats reduced with turpentine, if required for working.	3 00
Dark Permanent Wood-Filling, *(A patent article for priming outside work, and permanently filling and darkening natural woods.)* **Light Permanent Wood-Filling,** *(Precisely same article as above, but being light colored it fills without staining the natural wood, and is specially adapted to priming Cars.)*	This article, being a very penetrating and non-evaporating anti-damp of extreme durability, is a perfect and permanent filling for the pores of wood. Experience has proved that it will not only support the color and varnish better and longer than the old method of lead priming, but that on account of its permanent elasticity, it will neither crack nor flake off; besides which, it saves time, labor, and cost, and is more convenient, cleanly, and healthful.	4 00

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We claim that our *Finishing Varnishes* are unsurpassed in the following qualities:

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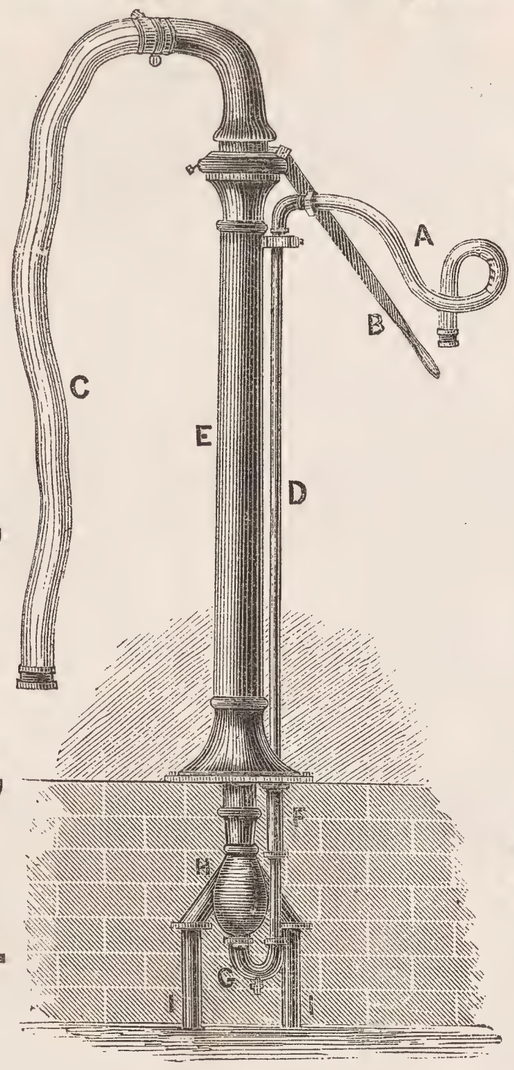
DISPENSES WITH **Tanks, Tank Houses, Stationary Power,** AND **Attendance.**

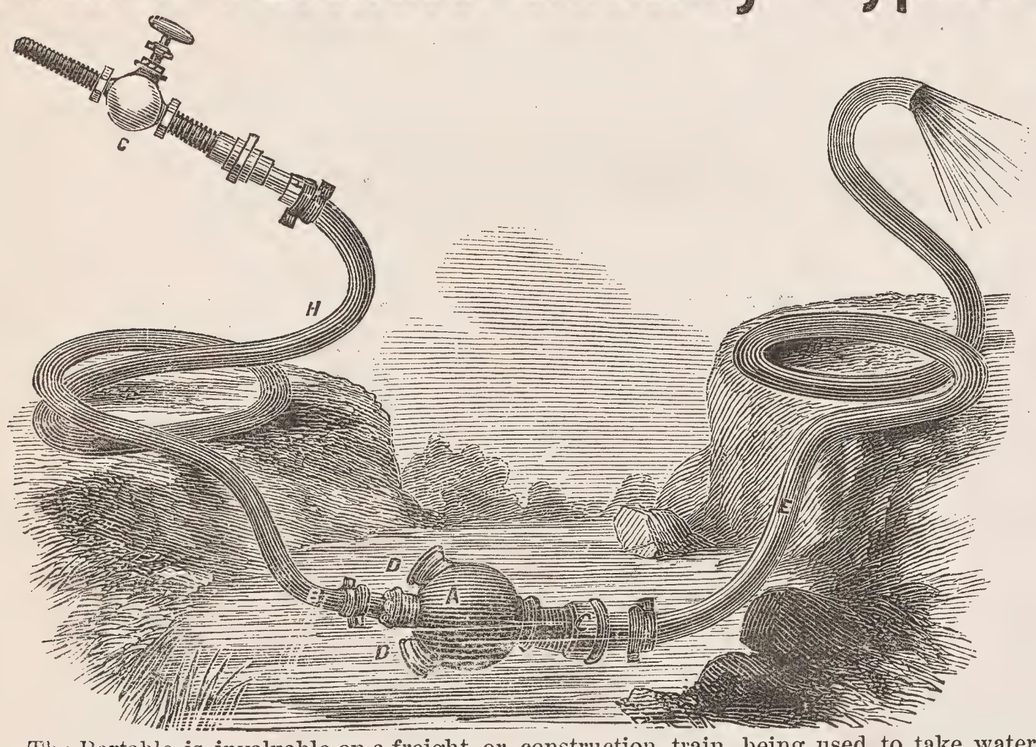


CAN NOT **FREEZE** IN ANY **CLIMATE,** UNDER ANY **CIRCUMSTANCES.**

Costs Less THAN ONE HALF THE PRICE OF A **Frost Proof TANK.**

The Engineer in charge of the Locomotive attaches the Hose A to a steam valve in the boiler. Steam passed through the pipe D and slip joint F into the globe H, producing a vacuum; the water is then lifted through the pipes I I and forced through the column E and hose C into the tender, filling any ordinary tender in about three minutes. When steam is shut off all the water in the pipes returns into the well, and any condensed steam passes off through the drip valve G, leaving nothing to freeze. The handle B serves to turn the discharge pipe and hose in any direction. The water delivered into the tender is warm, thus utilizing the steam used. The discharge tubes, represented above made of hose, can be made of iron if preferred.

LANSDELL'S
Patent Portable Railway Syphon.



The Portable is invaluable on a freight or construction train, being used to take water at points where there are no water stations. With it water can by taken from any point within one hundred feet of the track where there is water six inches or more in depth. The valve C is tapped into the locomotive boiler; steam is let on through the hose B; water is drawn through the orifices D D, and forced through the hose E into the tender, filling any tender with warm water in from six to twelve minutes.

Lansdell's Patent Steam Syphons, Double Suction, adopted by the United States Board of Supervisors, and approved by the Secretary of the Treasury for use on Steamboats.

For Price and particulars, apply to the General Agents of the STEAM WATER STATION COMPANY,

LENG & OGDEN,

IRON AND STEEL DEALERS AND IMPORTERS,

4 FLETCHER STREET, NEW-YORK,

Sole Agents for Credenda Steel Gun Barrels and Moulds, and the Cold Drawn Patent Weldless Steel Tubes.

Noyes' Patent Liquid Packing

FOR COOLING

Railroad Car Journals and Bearings of all kinds.

The attention of Railroad men, as well as all others who are running heavy journals is respectfully invited to the above Liquid Cooler. It has been successfully introduced on several Railroads, and is constantly growing in favor as its merits become known, and we are confident that practical men can not fail of being convinced that our preparation deserves their candid attention. What we claim for it is:

That it will cool a journal while a car is in motion, and that its use will in a great measure prevent its occurrence, saving expense, delays, and accidents; that mixed with mineral oil it gives a soft heavy body, essential elements which this oil lacks, especially in warm weather, besides keeping it sweet and preventing oxydation; that a journal will wear longer and with less friction, and be better and more thoroughly oiled; that the heat from the journal is thrown off at a temperature below that required to melt the babbitt, saving it from being destroyed, and preventing an accumulation of heat; that there is less liability of waste packing of journal getting on fire, as the non-inflammable elements of the Liquid permeates the waste and prevents it; that it will cause a considerable saving in the expense of oiling, as it imparts additional lubricating qualities, as well as body which prevents waste from running off, keeps the journal smooth and polished, and hardens the bearings; that a trial will satisfactorily demonstrate its superiority to sperm or lard oil, and that used according to directions it is even cheaper than mineral oil, which is the lowest-priced lubricating oil in the market.

We do not claim the Liquid Packing as a *durable* lubricator of itself alone, but when used with good mineral oil according to directions, we do claim that it constitutes a cheaper, better, and more durable lubricator than any thing offered for the purpose under whatever name.

One thorough application of the Liquid on a hot journal will do more execution in cooling, than the constant application of water for half an hour, besides doing it evenly and without loss of time.

DIRECTIONS FOR USING.

FOR COOLING OFF A HOT JOURNAL WHEN CARS ARE IN MOTION.—For this purpose procure a can holding two gallons, the nozzle having an outlet of not less than half an inch, and always keep it well filled with the Liquid Packing for immediate use. When a hot journal is discovered, apply the Liquid slowly, first giving the contents of the can a thorough shaking, and then proceed. Examine journal at next station, and if not cooled down to a proper temperature, apply again, and so on until it is accomplished, then fill up the box with native lubricating oil; this is particularly necessary in all cases where animal oil is used as a lubricant. In all ordinary cases this treatment will effectually cool off a journal in a short time, and without causing scarcely any delay of train. *Where a box is on fire,* pour on the Liquid which will extinguish the fire immediately. In extreme cases, where the babbitt metal has melted, or where journals are extremely rough, the journal may become hot again. If so, repeat application of Liquid as directed, and then fill up box with native oil, and so on as often as may be necessary to the end of route. A can of the Liquid Packing, together with a can of native oil, will insure the safe delivery of cars troubled with hot journals, with scarcely any delay. A smoky and hazy emanation from boxes in which the Liquid is used, simply indicates a rough journal, and that the heat is being conveyed away from it. In such cases look to it occasionally, and keep it well supplied with the Liquid. Should the Liquid become too thick to run freely from the nozzle of can, from the action of the weather, thin to the required consistency with mineral oil.

FOR A GENERAL LUBRICATOR.—Add one part of Liquid Packing to two parts of native West-Virginia or paraffine oil, and use in regular way. Or, if preferred instead, use the Liquid Packing in every third or fourth oiling, according to the temperature of the weather and quality of oil. Used in this way, aside from its cooling qualities, it makes a lubricator that can not be excelled in price and quality.

WHAT RAILROAD MEN SAY OF IT.

MR. NOYES: FITCHBURG, MASS., Aug. 20, 1872.

Dear Sir: I have used your Liquid Packing for the past four months, and am perfectly well satisfied that it is the most effectual article ever in use for the purpose claimed. I have just ordered another barrel. If all railroad companies would adopt your Liquid Cooler, I think they would find a saving of nearly 20 per cent. when used with mineral or black oil according to your directions, JACOB MARSH, *Master Car-Builder Troy and Greenfield R. R.*

MR. P. NOYES: SALEM, MASS., Aug. 7, 1872.

Dear Sir: I have been using your Liquid Packing for cooling car journals, for some time past, and have been well pleased with it. I have had occasion to use it a number of times, under Pullman Cars, and it has been a complete remedy in every case of hot journals.

Every train should be provided with it, as it is a saving of time and expense in the running of trains, provided it is applied and cared for according to directions for using.

J. P. SOMERBY, *M. C. B. of Eastern Railroad.*

MR. P. NOYES, Agent: WORCESTER, MASS., July 11, 1872.

Dear Sir: Please send us another barrel of your Liquid Cooler. Have been experimenting with it for the past six months, and find it all you recommend. It can not fail of accomplishing the work, and with it and a can of native oil. can deliver my cars any where in good condition. I find, however, as you stated, that it will not work with amimal oil, but with mineral oil, and when used according to your directions it works entirely satisfactory. I shall take especial pains to pass its merits along. OSGOOD BRADLEY, *Car Manufacturer.*

MR. NOYES: OFFICE OF NORTHERN RAILROAD, CONCORD, N. H, May 26, 1872.

Dear Sir: Send to this corporation a barrel of your Liquid Packing. The sample package cooled four hot boxes within a distance of eight miles. I shall have a can on board each train, for it gives perfect satisfaction. A. LANGMAID.

P. NOYES, Esq.: ALBANY, Nov. 1, 1872.

Dear Sir: I received the barrel of Liquid Packing you sent me for trial, and gave it out to our most experienced conductors to use according to directions. Below please find their report:

We, the undersigned, Freight Conductors on the Eastern Division of the N. Y. C. & H. R. R.R., have used the Liquid Packing furnished by Mr. Jones, and find that when we arrive at a station with a hot journal, the Liquid Packing cools it sufficiently by the time we arrive at the next station to use the Black Oil, and then have no trouble in getting through with it. It is the best we ever used. R. H. FISHER, A. W. GETMANS, R. H. HEATH, WM. HESS, Conductors E. DIV. N. Y. C. R. R.; I. FERGUSON, Conductor H. R. R.R.

JOSEPH JONES, *M. M. N. Y. C. & H. R. R. R., E. Div.*

BELT AND LEATHER STUFFING CO.: NEW-YORK, PROVIDENCE, AND BOSTON R. R. Co., PROVIDENCE, Aug. 3, 1870.

Gentlemen: Some two months since I received from you a can (1½ galls.) of your Liquid Packing for cooling Journal Bearings on cars; I had just repaired and put to running an engine; the first trip the truck boxes (all new) heated badly. I gave the Liquid Packing to the engineer and instructed him to use it according to directions. The consequence was that we had no more hot truck boxes. I was so well satisfied with it that I ordered a barrel, and for the past month, when we have a hot box on any of our cars, we apply at once your Liquid Packing, which has in all cases, thus far, cooled the journal so as to give no further trouble or delay. During the past two weeks we have received from the Taunton Car Co. four new passenger cars; the two first when received by us from Taunton had each journal VERY HOT, with the babbitt metal melted out of brass shells, I renewed the metals and packed them with your Liquid Packing. The cars have been running 150 miles each day ever since, WITH NO MORE HOT BOXES. Some ten days since we received from the N. L. & N. H. R. R., at the Ferry Boat at Groton, (through express train from New-York to Boston, shore line,) a car having a red-hot box; your Packing was at once applied, cooling the journal so that the men were able in a few moments to put in a new metal; they then repacked with your Liquid Packing, according to your printed directions, and the car came into Providence, a distance of sixty-three miles, perfectly cool, without any further trouble. If it continues to work as well, I can not do without it. I cheerfully recommend it to all Railroads, as being an article which they will find invaluable in all cases of hot journals.

J. H. ANDERSON, *Master Mechanic.*

Send for a barrel. No charge unless it does all we state.

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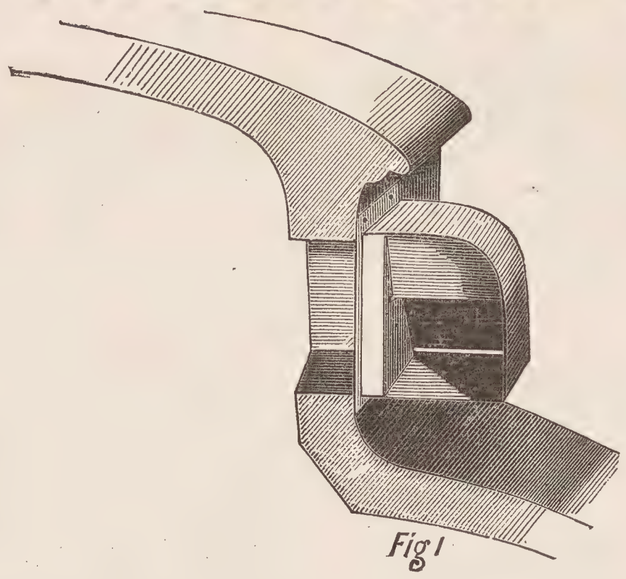


Fig 1

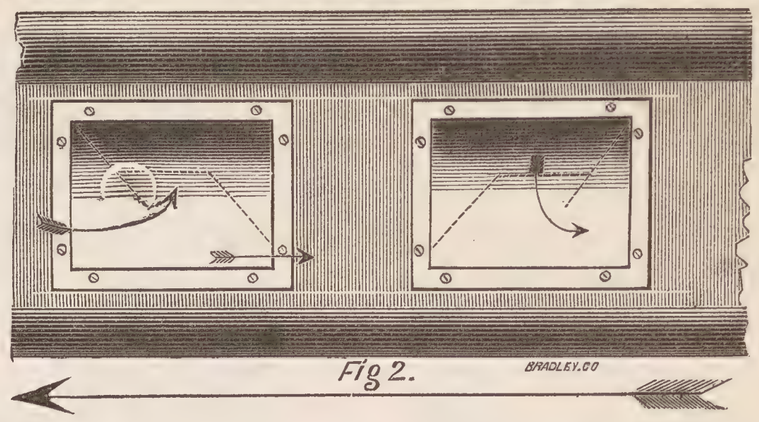


Fig 2.

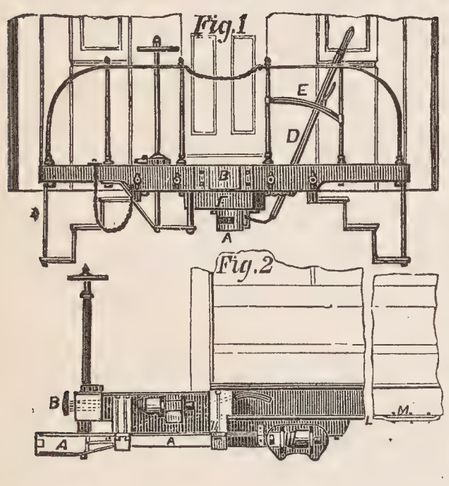
The Ventilators are placed as usual in the car roof as shown in Fig. 1, their mouths facing alternately in opposite directions, those facing forward admitting the air, and those facing backward affording an exit. Fig. 2 represents a side section of the raised roof with two of the ventilators alternately arranged. When the car is moving in the direction indicated by the arrow, it will be seen, by the curved darts, that there is an ingress and egress of air constantly taking place. The operation of the ventilators is reversed with precisely the same effect, when the car moves in the opposite direction. The internal structure is such that the dust and cinders passing into the mouth of the ventilator are intercepted by striking against two shields, shown in Fig. 1, and indicated by dotted lines in Fig. 2, and are thus naturally thrown to the bottom, where they are carried out through a small opening as shown in Fig. 1, and by the straight dart in Fig. 2, a current of pure air being forced into the car at the same time through a lateral opening. The faster the car moves, the greater is the quantity of air admitted and expelled, thus securing a free circulation which does not subject the occupants to a direct current or draught. The ventilator is also noiseless in its operation. There is no clattering of valves, and no change is necessary when the car reaches its destination. Once put in place, it is always in readiness, and runs itself independent of all employees.

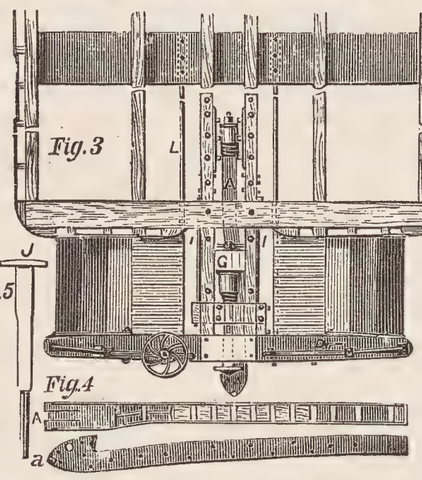
H. D. CARROLL & CO., Springfield, Mass.,

Proprietors and Manufacturers.

ROBERT HITCHCOCK, Inventor.

MILLER'S TRUSSED PLATFORMS. Compression Buffers and Automatic Couplers for Railroad Passenger Cars.





Office, 231 Broadway, (Rooms 4 and 5,) New-York.

Send for Illustrated Pamphlet, and call and see working models. E. MILLER, Patentee

DESCRIPTION.

Figure 1 is an elevation; Figure 2, a longitudinal section; Figure 3, a plan of an end of a car to which the arrangement has been applied; and Figures 4 and 5 show top and side views of the "Hook" and "Buffer," drawn on a larger scale than that of Figures 1, 2, and 3.

The letters refer to the same parts in all the figures. A is the coupling "Hook," B the "Buffer," C the "Stop," D the "Lever," E the "Quadrant Ratchet," F the "Truss Beam," G the "Spring Beam," H the "Suspender Beam," I the "Upward Trusses," K the "Main Spring," L the "Downward Trusses," and M the "Bolster."

The Platforms, instead of being located below the centre line of the main sills of the cars, are placed *in* that ine, and held there by the Trusses I and L, so that the point of contact (in Buffers B) is *in* the said centre line and *not below* it.

The coupling "Hook" A is attached to the draw spring the same as the ordinary draw head, and at the same height above the track, but in such a manner that the outer end is free to move laterally for a short distance. The Coupling Hook projects beyond the platform. The Stop C is placed under the Buffer Beam to prevent accidental uncoupling. When two cars are brought together, the Coupling Hooks, from *their shape*, push each other aside, until the Buffers B are compressed hard on the Buffer Springs, then—*the points of the hooks having passed each other sufficiently far*—the Hooks are carried forward by their main-springs, and thus the "*Coupling*" and "*Compression*" are both effected automatically *and at the same time*, and without the use of links and pins. When two cars are thus coupled together, the *head* of the *Hook* of each car is under the Buffer Beam of its opposite car, and the platforms are close together, (about 4 inches apart.) The effect of this is, *one platform can not be forced over the other*, nor can a *child* fall between the platforms; the dust and rain are nearly all shut out; the "Compression" makes the train run steadily, and prevents all jerking at starting and stopping.

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CHAS. R. PEDDLE, Superintendent M. P. and M. of St. L., V., T. H. and I. R. R.
O. A. HAYNES, Master Mechanic St. Louis and Iron Mountain Railroad.
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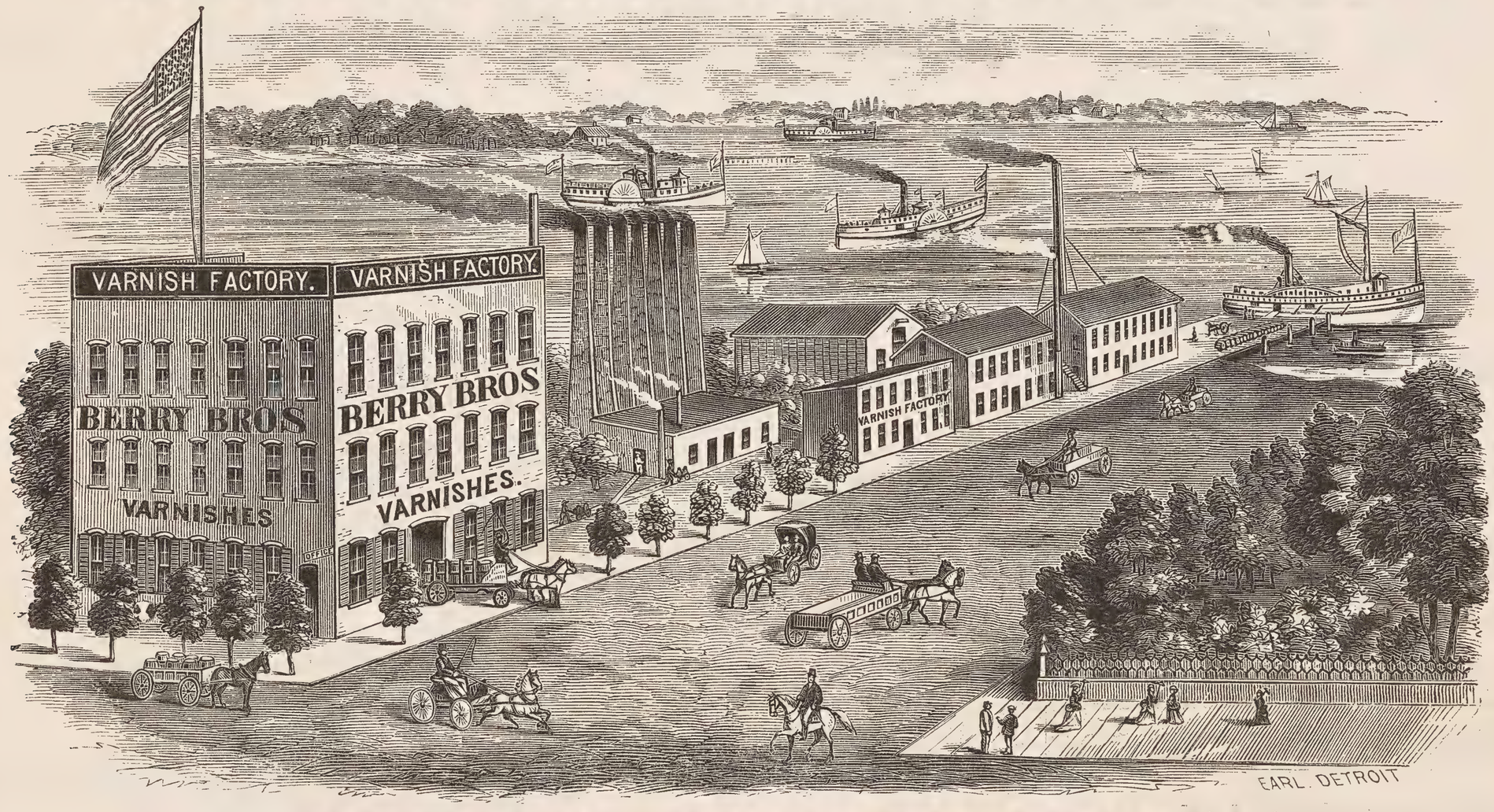

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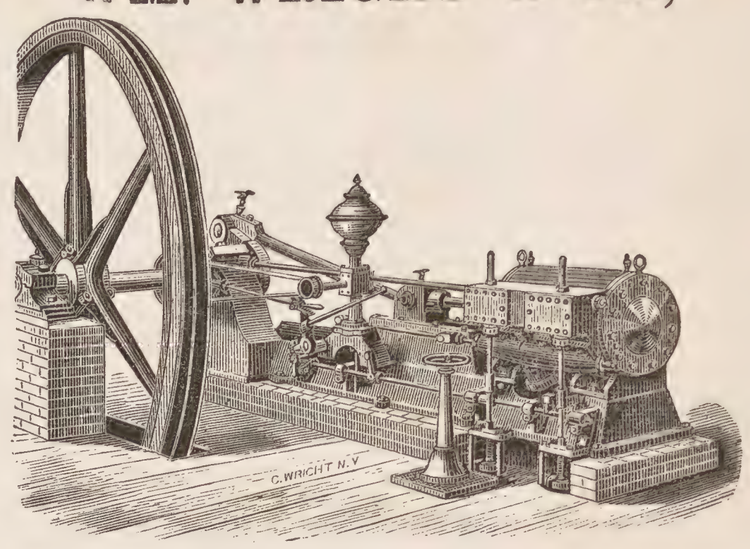

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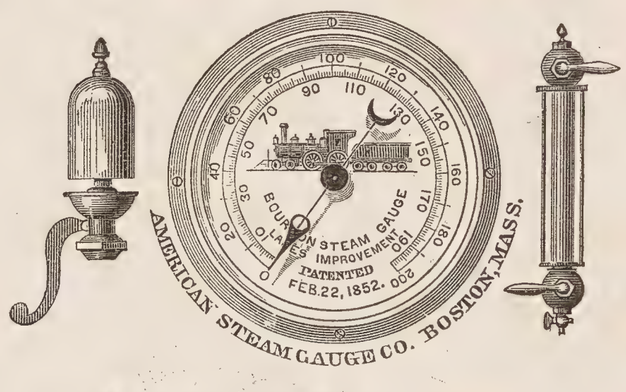

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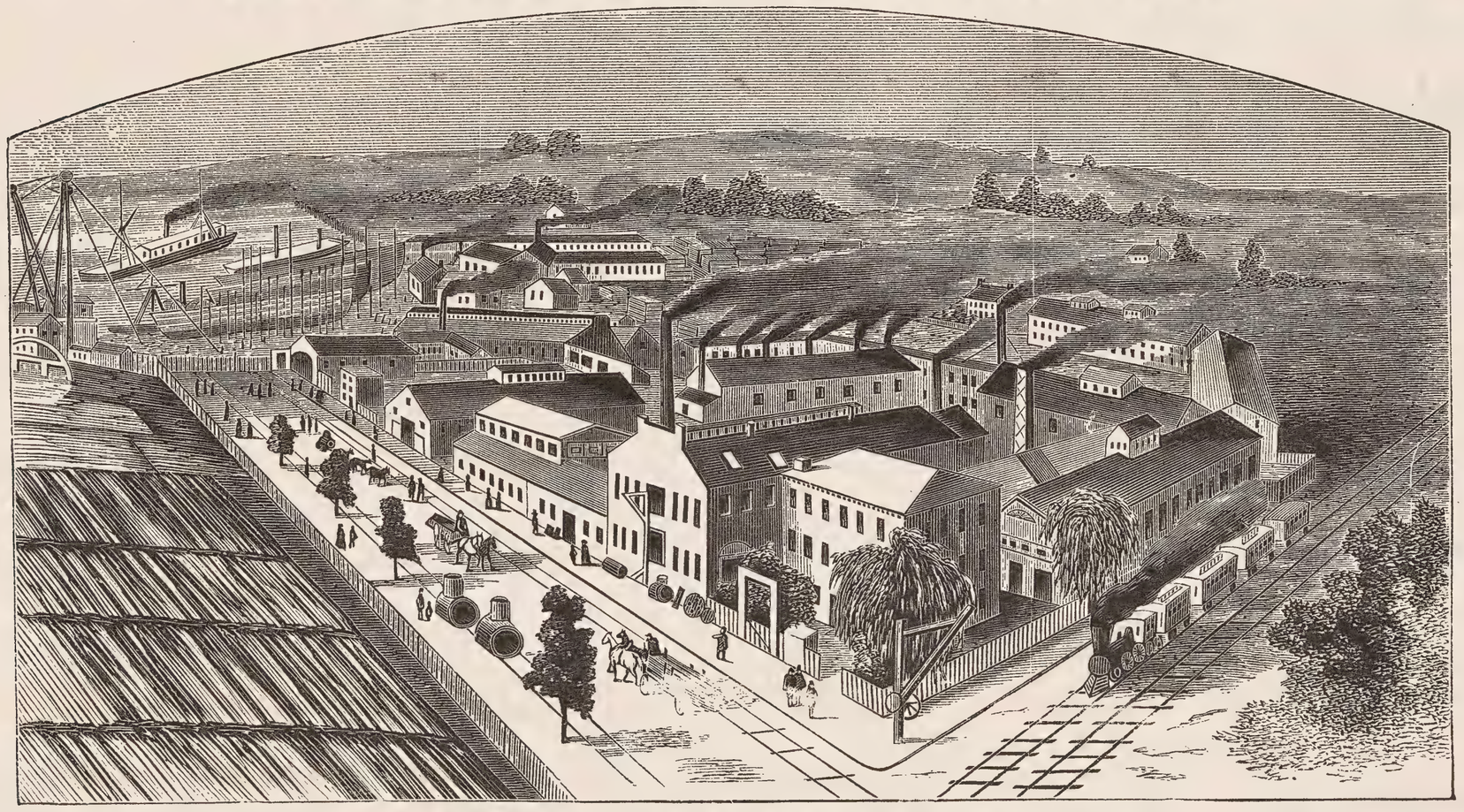

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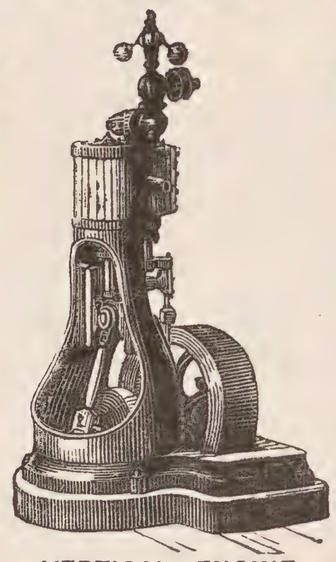

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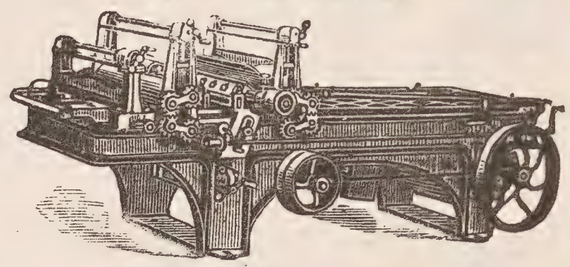

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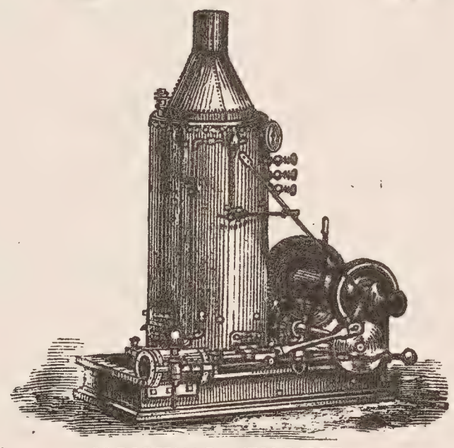

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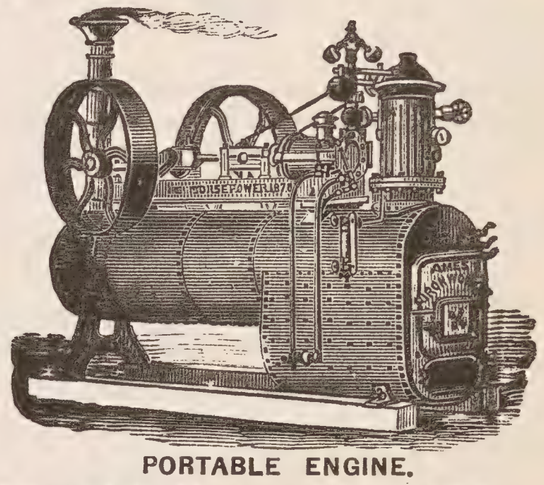

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THE NATIONAL CAR BUILDER.

DEVOTED TO THE INTERESTS OF RAILWAY ROLLING STOCK.

Vol. IV.
No. 7.

JULY, 1873.

One Dollar per Annum.
Single Copies, 10 Cents.

REPORT

OF THE

PROCEEDINGS OF THE SEVENTH ANNUAL CONVENTION OF THE MASTER CAR-BUILDERS' ASSOCIATION.

THE delegates to the Seventh Annual Convention of the Master Car-Builders' Association, assembled on the 11th of June, 1873, at Meionaon Hall, in the city of Boston. The President of the Association, Mr. M. C. Andrews, late of the New-York and New-Haven Railroad, not being present, the Convention was called to order, at 10 o'clock A.M., by the Vice-President, Mr. M. P. Ford, of the Pittsburg, Cincinnati, and St. Louis Railroad.

The Chairman introduced to the Convention Rev. H. W. Foote, of Boston, who opened the proceedings with an appropriate prayer.

ADDRESS OF THE MAYOR OF BOSTON.

Hon. Henry L. Pierce, Mayor of the city of Boston, being present, was introduced by the chairman, and addressed the Convention as follows :

Gentlemen of the Master Car-Builders' Association :

I am very happy, on my own behalf and on behalf of the citizens of Boston, to welcome you here at the present time. You are here, as I understand it, from every State in the Union—your associations extending to every State,—and you are here that you may impart information from one to another, and compare your experience, so that you may improve the railway-carriages for the transportation of passengers and freight, throughout the country. Nothing can be more worthy of such an assemblage than this object of your meeting. It concerns the comfort, the happiness, and the prosperity of the people of our country. When I look back and see the great improvement that has been made in the railway-carriages of the United States since those originally constructed, I can not doubt that a great share of that improvement has been caused by the free consultation and conference which has been had by men engaged in the construction of those carriages, who have met on occasions like this. We know, gentlemen, that all great improvements have been carried forward by just such assemblages as this ; and I can not doubt that these conventions will tend to improve still further, and to carry to a still higher state of perfection the comfort and convenience of the railway-carriages of the country.

I trust that you will have a pleasant and agreeable stay among us, and that your deliberations will be crowned with great success, and result in great benefit to all of you. Knowing that you do not desire me to detain you with an extended speech, I again, in closing, bid you a cordial welcome to our city. [Applause.]

THE CHAIRMAN, addressing his honor the Mayor, said :

It is understood on the part of all of us that we are not speech-makers, and I have only to say in reply to your kind words of welcome, in behalf of the Association, that we thank you for this greeting, and for these words of encouragement that you have spoken.

THE CHAIRMAN announced that the first business in order would be the reading of the minutes of the last annual convention ; when, on motion of Mr. Van Houten, the reading of the same was dispensed with.

THE ROLL OF MEMBERS.

The Secretary then called the roll of members, when the following gentlemen answered to their names :

F. D. Adams,	Boston and Albany R.R.
George R. Bentley,	Norwich and Worcester R.R.
C. A. Smith,	Erie Railway.
A. Steinbach,	Philadelphia and Reading R.R.
Joseph Jones,	New-York Central and Hudson River.
Ruel Dean,	Taunton Car Co
William Johnson,	New-York Central and Hudson River.
H. O. Wadlie,	Illinois Central R.R.
H. Longest,	Richmond, Danville, and Piedmont R.R.
W. A. Morgan,	Virginia and Tennessee R.R.
Milton Wilder,	Erie Railway.
George E. Stevens,	Union Pacific R.R.
S. A. Davis,	Boston, Lowell, and Nashua R.R.
James McGee,	Pittsburg, Cincinnati, and St. Louis R.R.
D. H. Baker,	Pennsylvania R.R.
H. M. Perry,	Hartford, Providence, and Fishkill R.R.
W. E. Chamberlain,	Boston and Albany R.R.
R. B. More,	Indianapolis and St. Louis R.R.
W. J. Worth,	Phila., Wilmington, and Baltimore R.R.
D. Hoit,	Toledo, Wabash, and Western R.R.
J. B. Weston,	Boston and Albany R.R.
A. H. Dennett,	Eastern R.R.
A. C. Robson,	Lake Shore and Michigan Southern.
J. P. Somerby,	Eastern R.R.
J. W. Philbrick,	Maine Central R.R.
C. H. Kenison,	Maine Central R.R.
Robert Gunning,	Allegheny Valley R.R.
Ellis Dodge,	Long Island R.R.
John T. Nalls,	Wash. City, Va. Mid., and G. Southern.
F. O. Bray,	Lake Shore and Michigan Southern R.R.
F. Childs,	Great Western and Canada R.R.
G. W. Demarest,	Northern Central R.R.
Elias E. Pratt,	Boston, Hartford, and Erie R.R.
C. E. Garey,	New-York and Harlem R.R.
B. N. Phelps,	Fourth Avenue City Line, N. Y. City.
J. J. Traver,	Adirondack R.R.
Joseph Brightman,	Providence, Warren, and Bristol R.R.
Samuel Griffith,	Indianapolis, Cincin., and Lafayette R.R.
O. C. Patchell,	Blossburg and Corning R.R.
J. N. King,	Chesapeake and Ohio R.R.
John G. Brady,	Portland and Rochester R.R.
Enos Varney,	Fitchburg R.R.
A. Gleason,	Old Colony and Newport R.R.
V. D. Perry,	Hartford, Providence, and Fishkill R.R.
George Hackett,	Central R.R. of New-Jersey.
Leander Garey,	New-York and Harlem R.R.
W. R. Davenport,	Erie Car-Works.
L. H. Cummings,	Cummings Car-Works.
James T. Leighton,	New-Haven Car-Works.
Samuel Campbell,	Jackson and Sharp Co.
George Dunham,	Union Line and Transportation Co.
J. F. Elder,	Pennsylvania R.R.
J. J. Ferris,	Housatonic R.R.
I. W. Van Houten,	Pennsylvania R.R.
T. B. Stewart,	Hartford and Wethersfield Street R.R.
D. H. Stratton,	Tioga R.R.
Thomas G. Davis,	Boston and Lowell R.R.
Robert Hitchcock,	Connecticut River R.R.
Jacob Marsh,	Vermont and Massachusetts R.R.
Thomas Randall,	Portland Car-Works.
B. F. Mitchell,	Grand Trunk Railway.
W. J. Calais,	Wilmington, Columbia, and Augusta R.R.
M. N. Forney,	*Railroad Gazette.*
E. A. Olmstead,	United States Rolling-Stock Co.
R. S. Ramsey,	Pennsylvania R.R.
J. N. Mileham,	Buffalo Car Co.
M. P. Ford,	Pitts., Cin., and St. Louis R.R.
Hugh Gray,	Chicago and North-Western R.R.
D. S. Dockstader,	Atlantic and Great Western R.R.
John Lightner,	Boston and Providence R.R.
M. C. Andrews,	Late of New-York and New-Haven R.R.
D. C. Richardson,	Boston and Maine R.R.
M. W. Dickerman,	Manchester and Lawrence R.R.
John McVay,	McVay, Walker & Co.
C. J. Holbach,	Catasauqua and Foglesville R.R.
George W. Bitner,	Pittsburg Car-Works.
Samuel Stevens,	Boston, Concord, & Fitchburg R.R.
George H. Pratt,	Atlantic Car-Works.
W. H H. Price.	St. Louis and South-Eastern R.R.
W. H. Paige,	Wason Manufacturing Co.
A. Langley,	Northern New-Hampshire R.R.
J. D. McIlwain,	Lake Shore and Tuscarawas Valley R.R.
J. Gill Blain,	Gill Car-Works.
Christopher Woods,	Union Transportation Co.
A. J. Allen,	Indianap., Bloomington, and Western R.R.
J. E. Wiggens,	Late of New-Jersey Midland R.R.
James T. Patten,	Patten Car-Works.
James Denver,	New-York, New-Haven, and Hartford R.R.
Jacob Hay,	Mobile and Ohio R.R.
M. Sessions,	Taunton Car Co.

The next business in order was the election of a Vice-President *pro tem.;* and Mr. V. D. Perry, of the Hartford, Providence, and Fishkill Railroad, was thereupon unanimously chosen.

ADDRESS OF THE CHAIRMAN.

MR. M. P. FORD, Vice-President and Chairman of the Convention, then delivered the following address :

Gentlemen of the Master Car-Builders' Association :

On this the 11th day of June, 1873, you are again in session pursuant to adjournment. For myself, I very much regret that, owing to the absence of our President, it so unexpectedly falls upon me to perform the duties of his office. Fully sensible of my inability to say any thing which will be of interest or profit, still, in obedience to the requirements of our constitution, I feel that I must at least rise and appear before you.

You will allow me to congratulate you, on this the seventh annual meeting of our Convention, that we have so many present at its opening session. May we look upon this as a guarantee, not only of our steady growth, but of the increasing value of the Association to us as a help in acquiring that knowledge which will enable us to perform our duties more effectively and economically to our several corporations, and to serve the traveling public by adding to their safety and comfort. It was for this, and to help us in keeping pace with the improvements which are constantly being made in this age of progress, that our Association was formed. And how can we better carry out this object than by meeting in a convention, and, by free discussion and interchange of thought, gaining that knowledge which, single-handed and alone, we could not acquire ?

There probably never has been a time when there was a more imperative necessity for all those occupying important positions in any of the mechanical branches, to keep their eyes and ears open, and use all means in their reach to acquaint themselves with the improvements which are constantly going on around them. And especially is this true with us. Most of us can probably call to mind the time when the cars upon their several roads seldom went beyond the termini of those roads. Now we find them going the whole length and breadth of our land, and made of almost every conceivable pattern. Questions of great importance in connection with the construction and maintenance of the vast rolling-stock of our railroads are constantly coming up before us. Our experience year by year should help us to solve them. We are all aware that there is a diversity of opinion in the minds of railroad officials in relation to the efficiency of our meetings. Some are free to assert that the main object is to enable the members to get together and have a good time. Others may perhaps expect more of us than we shall be able to perform. But I believe we shall be able to demonstrate, or rather that we already have demonstrated, that we are laboring by means of our association to better fit ourselves for the trust confided to us.

We have some important questions which are to come up before us at this meeting. I trust that the committees which were appointed a year ago, to whom these questions were submitted, and from whom we expect reports, are prepared to make those reports. Let us have a free and full discussion of them. I would recommend that the committee to be appointed to report upon business to come before the next meeting be chosen early in the session, in order that the committees to whom these questions shall be referred, may be fully decided upon before our adjournment. As I said before, we have several important questions to come before us, and, according to our constitution, we hold but one session daily. With the amount of other business which must come before us for action, I think it will be manifest to all that it is only by close attention to business and earnest work that we can accomplish the purposes which we desire to accomplish at this meeting. I thank you for your attention to these broken remarks, and solicit your support in the discharge of my duties. [Applause.]

TREASURER'S REPORT.

MR. AARON STEINBACH, Treasurer of the Association, presented his annual report as follows :

The Master Car-Builders' Association.

In account with A. STEINBACH, Treasurer.

CREDIT.

By Balance on hand at last report		$492 81
" Receipts and assessments to date		205 00
		$697 81

DEBIT.

To paid vouchers herewith presented, namely:		
" E. P. Coby for Printing	$12 75	
" Printing annual report and circulars	128 15	
" D. B. Frisbee	3 25	
" Secretary's postal account	35 48	$179 63
Balance on hand		$518 18

The report was accepted.

SUNDRY COMMITTEES.

THE CHAIR then appointed the following committees:

On Communications.—Messrs. F. D. Adams, of the Boston and Albany; James H. Leighton, of the New-Haven Car Company; and C. A. Smith, of the Erie Railway.

On Business for the next Annual Meeting.—Messrs. I. W. Van Houten, of the Pennsylvania R.R.; W. H. Dunham, of the Chicago, Danville, and Vincennes; and V. D. Perry, of the Hartford, Providence, and Fishkill.

On Assessment.—Messrs. S. A. Davis, of the Boston, Lowell, and Nashua; and W. R. Davenport, of the Erie Car-Works.

On Officers for the ensuing year.—Messrs. R. S. Ramsey, of the Pennsylvania R.R.; D. Hoit, of the Toledo, Wabash, and Western; and F. O. Bray, of the Lake Shore and Michigan Southern.

THE DICTIONARY OF TERMS.

The reports of committees being now in order, the Chair called for a report from the Committee on the Dictionary of Terms.

MR. F. D. ADAMS, of the Boston and Albany R.R.—I believe that the duty of acting as chairman of that committee has fallen upon me. We shall still have to beg the forbearance of the Association somewhat. We are well aware that, in our last year's proceedings, this matter was laid before you. It proved to be a good deal more of an undertaking than we had supposed we had assumed. I would simply say at this time that we have made some progress, but are not prepared with any thing like a full report. Mr. Forney, associated with us on the committee, has this matter in hand and will explain it more in detail than I can. I would call upon him to make such an explanation of the progress that we have already made. The association will fully understand that this is a matter of a great deal of labor. If we are going to accomplish what we desire to accomplish, and that which will be available, we have got to do it carefully and thoroughly and not hurriedly. The more we examine this matter the more do we perceive its great importance, and consequently we want to feel that we have done a work satisfactory to the association. If it takes us five years to do it, we are going to do it well if we can. But we do not understand that it will take us as long as that. We hope that one year will suffice to put it in shape.

MR. M. N. FORNEY, of the *Railroad Gazette.*—I propose to give you a history of what has been done in this matter. We met in New-York to discuss and determine upon some method of doing this work. The matter was then submitted to a committee of three, consisting of Mr. Smith, Mr. Garey, and myself. Mr. Smith and Mr. Garey finally concluded to resolve that committee into a committee of one. That one was myself. Upon accepting the duties, I found I had on my hands an elephant of the largest size. The preparation of this dictionary involves a great deal of work, as you can well imagine, the idea being that we should get the name of every piece about a car, and describe it in such a way that every man when he sees the drawing in the dictionary shall be certain that the piece there represented is the one he is searching for. I employed a draftsman, and his work is here in this room subject to your examination. It is proposed to have these drawings lithographed and the parts numbered, so that any one who wishes to find any special part, can refer to the drawings and find the piece he is looking for, and then, on referring to the list, find the appropriate name of that piece. These names and descriptions have been prepared with great care, and will represent the condition of cars in this country very thoroughly.

There is considerable work still to be done, but I think it is in such a state of forwardness that we will be able to put it in the hands of the printer in a very few months, so that before the next meeting we will have a dictionary in some sort of complete form. I would not like to have the members understand that this dictionary, when published, will be perfect and complete in all its parts. We shall be obliged to publish a new edition of it very soon, with additions and amendments, such as will suggest themselves as we progress in our labors.

There is another very important question which the Association will have to consider, and that is with reference to the cost of the publication of this work. It is proposed to charge two dollars a number for the book. Of course, if we sell copies enough, that will pay the expense; but there is some uncertainty about it. It is difficult to estimate, from the number of people who ought to buy a book, how many actually will buy it. The convention will have to make some appropriation for the expense, which will be from $600 to $800; some members think a thousand dollars will be better.

Several methods have been proposed. The first is to rely upon the sale of the books for the money required. The next plan was to appeal to the railroad companies. Another plan was that a few pages of the book should be devoted to advertisements. There is considerable objection made to this last-mentioned plan, and it is said that we ought not to allow advertisements to be inserted in it. The idea has been suggested that several pages of the book should be divided into spaces, and that each person selling material employed in car-building should be allowed to occupy one of these spaces on payment of five dollars. It is, of course, for the convention to adopt that plan if they see fit. Many entertain the opinion that it would be very effective and pay expenses very readily. A number of members, however, think that any advertisements are objectionable, and that some better method should be adopted. The Association will have to take up this matter and discuss these several plans and come to some decision in relation thereto.

MR. I. W. VAN HOUTEN, of the Pennsylvania R.R.—I think we can make no better use of our time than to discuss this matter of the dictionary now. I think it would be well for the convention to instruct the committee on that subject to take it into immediate consideration and report at this present meeting—say to-morrow at twelve o'clock M., recommending such plan as shall seem to them best. If I was not on one of those committees, I should make a motion to that effect.

MR. FORNEY.—The committee have submitted three plans, one of which I have given in detail. If any member can submit any other plan, I am ready to hear it. If there is no other plan, it will be necessary to decide upon one of those three.

MR. VAN HOUTEN.—The subject has been talked over generally in the committee, but I have never understood that there has been any action taken by the committee to recommend any plan.

MR. FORNEY.—It was discussed informally to test the sense of the committee, but the gentleman is right in saying that there was no formal action taken.

THE CHAIRMAN.—There is no motion before the convention.

MR. WILLIAM JOHNSON, of the Erie Railway.—I would move that the convention assume the expense of this dictionary, and that each member donate a portion of the amount needed, aside from his regular assessments for the ordinary expenses of the association.

MR. W. R. DAVENPORT, of the Erie Car-Works.—It is important for us to understand just how this thing is to be done. If the motion proposes to have each member present subscribe for a certain number of copies at a certain price, then it becomes a plain business transaction. We are prepared to do that. But if we leave it all open at both ends, a very expensive dictionary may be the result, and the cost to each member may be made large. If Mr. Johnson will consent to a slight change in his motion, (I will not move any amendment,) I would like to have it put in such a shape that each member may subscribe for as many copies as he pleases, at a fixed price per copy. This would give the committee assurance of funds to pay for the book. I know very well that the report of the committee suggests that there is a great difference between the number of those who ought to buy a book and of those who will buy a book; but if a man puts down his name for a certain number of copies, then you are sure of a sale to that amount.

MR. JOHNSON.—I have moved that the association be responsible for the printing of that book, and that each member hold himself bound to pay his proportion of the expense, whatever it be. Each member, of course, is entitled to one copy. The committee are going to get that book up just as reasonably as they can, and it is a book that each car-builder will want.

MR. S. A. DAVIS, of the Boston, Lowell, and Nashua R.R.—I like the idea of the association assuming the publication. It seems to me that that covers the whole ground—that it is to be paid for out of the treasury. And if we vote to replenish the treasury, we can put our assessments at such a rate as will cover the expenses. Each member pays his part of it. Then let the association, as an association, sell those books and put the proceeds into the treasury.

MR. H. O. WADLIE, of the Illinois Central R.R.—I think this question is of such a nature that it can be divided. Therefore I would suggest that we pass upon the first half of it first, which would be that this association assume the publication of the book, leaving the other point to be settled afterward.

MR. VAN HOUTEN.—I would say that before this association collectively or individually assumes the responsibility of doing a thing, they ought to know whether they can afford to do it—whether they have got the funds necessary for doing it. Now, if this association sees fit to assume the responsibility of paying for the publication of this dictionary, (to which I have no objection,) then, I say, it makes it more important that it should go to some committee, in order to ascertain how many members' names stand recorded upon the list of this association, and how much each one of those members must be taxed in order to meet this expense. Then we come to something definite. Then let that committee report that fact—that it will be necessary to assess upon each member whose name is recorded, the amount of five dollars or ten dollars in order to meet that expense. That report comes before us at some adjourned meeting of this convention. Every member knows just what he is expected to do. If he is prepared to do it, and thinks it is a proper mode of doing it, he can vote for the recommendation of the committee. If he is opposed to it, he can vote against it; and thus we can get the sense of the meeting. If we are going to assume the responsibility, we must know where the money is coming from. I am not far from saying that to a certain extent this consideration may have held back the progress of the work for some little time. It may have been some part of the cause why the report has not been ready, or more nearly ready than it now is, because it is not to be expected that Mr. Forney or any other member of the committee can put his hand into his pocket and take out a thousand dollars for this purpose. We want to take some definite action by way of putting the money into the treasury to defray the expense. If we undertake any enterprise, let us prepare ourselves with the necessary finances, and then those in charge of it can draw upon the treasury for the amount that may be necessary to meet the expense

MR. L. GAREY, of the New-York and Harlem R.R.—Mr. Chairman, this appears to be rather a knotty question; but what I want to say about it is, that the matter has got into such a shape now that there has been considerable expense already incurred upon that dictionary, and there should be at least some means provided by which the committee can pay as far as they have gone. As the association all know, we have what we call a special fund for use, a portion of which we might appropriate for this purpose, so that the work can still be going on. I think we might easily appropriate a portion of the money in our treasury to meet the expenses of carrying on the work until the dictionary is ready. Then let the association decide in regard to the rest of the matter.

MR. FORNEY.—I would like to set myself right about this business. I have myself been at the expense of $175 for making drawings, and if I had had more money under my control, I would not have been able to advance the dictionary further than I have done. I don't mean to say that I am prepared to put my hand into my pocket and take out a thousand dollars for this purpose. But I had great confidence in the Car-Builders' Association, and therefore knew that any right and proper bills I might contract would be paid at the proper time. With reference to the mode of defraying the expenses of the publication, if the committee were authorized to insert advertisements, I would be willing to undertake the work myself, and I think I should make money out of it. But I think if there is money to be made, it should go to the association and not to any private party.

After some further conversation, the Chair stated the question to be that the association assume the expense of publishing the dictionary, and that each member be assessed for his proportion of the expense, aside from the assessments for the current expenses of the association; upon which question a vote was taken, and it was lost by a decided majority.

MR. S. A. DAVIS then moved that the association assume the expense of the publication, which motion was adopted without dissent.

MR. GEORGE HACKETT, of the Central R.R. of New-Jersey, then moved that the Committee on the Dictionary of Terms be authorized to draw on the treasurer of the association for the sum of $800, to defray the expense of its publication.

MR. ADAMS moved to amend the motion by empowering the treasurer to make an assessment of $800, which motion was lost.

The motion of Mr. Hackett was then agreed to.

HEATING, VENTILATING, AND LIGHTING PASSENGER-CARS.

THE CHAIR called for the report of the Committee on Heating, Ventilating, and Lighting passenger-cars, whereupon the report was presented and read by Mr. V. D. Perry, as follows:

REPORT.

To the Master Car-Builders' Association:

GENTLEMEN: The committee appointed at the meeting of your association in St. Louis, on the 12th

and 13th of June, 1872, to investigate the different methods of lighting, heating, and ventilating railway passenger-cars, beg leave to report as follows:

The following interrogatories were embodied in a circular sent by the secretary of the association to all the master car-builders in the United States, namely:

"1st. How many cubic feet of fresh air do you think should be supplied to each passenger per minute, in order to keep the air in a car pure? 2d. In your opinion, what are the best means for admitting this quantity of air into, and what for exhausting an equal quantity from cars in cold weather? 3d. Have you heating and ventilation combined? If so, how is it accomplished, and what are the results? 4th. What kind of stoves and fuel do you recommend for heating cars? 5th. What in your opinion are the best means for protecting cars from damage by fire in case of accident to the train? 6th. How are the cars on your road lighted; with gas, candles, or oil? If the latter, what kind of oil? 7th. Please state how the cars on your road are ventilated and warmed, and the number which use the various plans, with the general results; and give any other information relating to these subjects which you may consider valuable to the committee."

After wating some time, answers began to come in slowly, as follows: With respect to ventilation, one road used Cowell's exhaust ventilator on dome; 7 used Creamer's, 4 used Howard's, and 2 used exhaust ventilators in side of dome, and swing-sash in end of dome, receiving the air from under the end projection. One road uses exhaust ventilators of all descriptions in dome, and ventilators above the windows in the end of the car.

Your committee, after trying some experiments with the different kinds of ventilators—using powder for the trial—found that 1½ oz. of powder, exploded in any of the 76-seat passenger-cars, with only exhaust ventilators in the dome, would require 20 or 30 minutes to clear the car, on an accommodation train running against the wind at the rate of 21 miles per hour; while the same car with ventilators used over the end windows, and exhaust ventilators in the dome, required only from 8 to 10 minutes. Your committee are not able to give the exact amount of air forced into the end of the car, either through the opening over the windows, or through that in the end of the dome. Authorities do not agree as to the amount of fresh air required for each passenger per minute. It depends a good deal upon the cleanliness of the passengers. The estimates vary from 4 to 10 cubic feet per minute.

A 76-seat passenger-car, or a car 53 feet long, 9 feet high, and 8 feet 6 inches wide, contains about 4054 cubic feet of space. A train of 13 cars, containing 4054 cubic feet each, will contain in the aggregate 52,702 cubic feet. Allowing 76 passengers in each car, will give a total of 988 passengers. The quantity of air required for each person in a building, as estimated by various authorities, is from 4 to 6 cubic feet per minute. We suppose 4 would be ample for winter, and 10 for summer. 4 cubic feet per minute for 988 passengers, gives a total of 3952 cubic feet, or 237,120 per hour, which involves an entire change of the air in 13 cars in about every 15 minutes.

To accomplish the combined result of heating and ventilating passenger-cars, whereby passengers can be supplied with about 10 cubic feet of fresh air in summer, and from 4 to 10 cubic feet of fresh heated air in winter, Mr. Gordon, of Boston, has proposed the following method: He would place in a baggage-car, or in a car provided for the purpose, a fan and a small engine for summer purposes, and a large hot-air furnace, in combination with the fan and engine, in winter. These are to be connected with perforated pipes running through each car, the impure air to be exhausted through the bottom of the car. Your committee are aware that there is an objection to this plan, as the cars can not be heated or ventilated until the whole train is made up and ready for the road.

Another plan has been proposed by Sanborn & Gates, of Boston. Their plan is to heat passenger-cars by steam, the same as applied to buildings; placing a small boiler in the baggage-car, and conveying the steam through pipes which are to be connected with each car. For ventilating, they propose the use of a double-acting, reversible fan-blower, which is placed under the car, and is actuated by a belt from an axle of one of the trucks. The blower is supplied from an air-chamber at the side of the car, the air having previously passed through large screens to remove its mechanical impurities; thence it is driven through a single tube to the top or monitor part of the car, and is distributed to every part alike. The distributing tube, which extends around the top, is perforated with a very large number of small orifices, through which the air is emitted into the car in modified obliquely downward currents. By this means the original currents are so broken up and diffused as to be imperceptible to passengers, and the whole body of air in a car has a gentle downward motion. The provision for removing the air after it shall have accomplished its object, is by means of registers along the central aisle, which communicate under the floor with the outer air. The blower being capable of furnishing the maximum quantity of air when the car moves at its average rate of speed, the supply is easily adjustable by a cut-off in the connecting-pipe in its passage through the air-chamber, where it is out of the reach of the passengers. The exit registers are also adjustable, and may be closed altogether when desired. Whether the adjustment is for a large or small quantity, the supply is found to be quite uniform and regular while the car is in motion. The same objection will be found with the practical working of this plan as with Mr. Gordon's.

Your committee have received communications from 27 different roads in answer to the question as to the best method of heating cars. Ten of these roads use coal-stoves, twelve use wood-stoves, and five use Baker Heaters. None of them combine heating and ventilation.

Your committee do not see how they can improve the present mode of heating passenger-cars, unless by putting ventilators in the car, connected with the stove by a pipe, so as to warm the air the same as by a hot-air furnace before diffusing it through the car. Your committee believe that a more perfect system of heating and ventilating passenger-cars, both in summer and winter, can be devised by the adoption of plans similar to those before spoken of.

Your committee have not received any answers to the questions asked in number 5 of the circular, which suggest any practical method for protecting cars from damage by fire in case of accident; but would recommend that each train be provided with fire-extinguishers, axes, and pails, with increased protection for stoves.

On the question of lighting cars, your committee have received communications from 27 roads, as follows: 10 use candles, 14 use mineral sperm oil, two use kerosene, and one sperm oil. Your committee would recommend the use of mineral sperm oil, or any other oil that will give as good a light as kerosene, and stand a fire-test of not less than 300. We have tried several experiments with mineral sperm and other oils. The first experiment was to set fire to a barrel of shavings, and extinguish it by turning on mineral sperm oil. The next was to saturate three pine boards, 12 inches square each, the first with lard oil, the second with kerosene, and the third with mineral sperm oil. We then took red-hot cinders of equal size and put in the centre of each board, with the following result: The boards saturated with lard and mineral sperm oil, only burned a little more than the size of the hot coal; while the one saturated with kerosene spread and charred almost the whole surface.

From the few experiments we have tried, we would recommend the use of mineral sperm oil, it being as safe as either lard or sperm oil, and at the same time giving full as good a light as kerosene.

Respectfully submitted.

V. D. PERRY,
Hartford, Providence & Fishkill R.R.,
W. E. CHAMBERLAIN,
Boston & Albany R.R.,
A. GLEASON,
Old Colony & Newport R.R.,
Committee.

On motion, the report was accepted, and discussion postponed until to-morrow.

TRIAL OF BRAKES.

MR. ADAMS, from the Committee on Communications, presented a communication from James T. Furber, General Superintendent of the Boston & Maine Railroad, inviting the members of the association to witness a trial of air-brakes to be made this afternoon, which invitation was accepted.

On motion, the convention adjourned till 9 o'clock to-morrow morning.

SECOND DAY'S PROCEEDINGS.

The convention met pursuant to adjournment.

On motion, the reading of the minutes was dispensed with.

WARMING AND VENTILATING PASSENGER-CARS.

THE CHAIR stated that the first business in order was the consideration of the report of the Committee on Heating, Lighting, and Ventilation of Passenger-Cars. It was suggested yesterday that the report be considered in sections, in the order of the interrogatories contained in the circulars, the first of which was,

"How many cubic feet of fresh air do you think should be supplied to each passenger, per minute, in order to keep the air in a car pure?" The second question is: "In your opinion, what are the best means of admitting the quantity of air into, and what for exhausting an equal amount from cars in cold weather?"

MR. F. D. ADAMS, Boston and Albany.—I would like to inquire what the committee report in regard to the second interrogatory?

MR. V. D. PERRY read a portion of the report; after which a pause ensued, no one seeming inclined to open the discussion, wher upon

MR. M. N. FORNEY rose and said—I was in hopes some of the car-builders present would take up the subject of ventilation, because it seems to me so very important that it is worthy of careful consideration; but as there does not seem to be any willingness on the part of those present, I should like to say a few words myself in regard to the quantity of air required. I find in my intercourse with persons who have charge of cars, that there seems to be a good deal of vagueness in their minds in regard to the quantity of air which is needed for passengers. And, in fact, if any one will undertake to study the subject of ventilation from the books which have been written about it, he will find there is an almost equal degree of vagueness in them in reference to that point. One of the best books I know of on the subject, or rather one of the best books which indicate the quantity of air required, is "Huxley's Physiology," which I would recommend every member to read who cares to investigate this subject. It has a great deal of other information besides what relates to fresh air. Its article on this subject is better than can be found in any other book. The committee have said in their report that they thought four cubic feet of air per minute, per passenger, in the winter, and ten cubic feet per minute, in the summer, would be sufficient. Now, while I have no doubt the committee have investigated this subject with a great deal of care, I am not prepared to agree that a less amount of fresh air is required in winter than is required in summer. Air, in winter, will be vitiated just as soon as it will in summer; and the thing is to keep the air as pure as possible in winter as well as in summer. In the little book which I have referred to, the doctor says one of the most delicate tests which can be used of the purity of air is that nature has provided us with, and that is our organ of smell. We can detect impurities from odor quicker than in any other way. From what he says, I have deduced that about from seven to ten cubic feet of air, per minute is required for each passenger, to keep air in such a state of purity that the foulness can not be detected by the organ of smell. A good deal of difficulty attends the purification of that quantity of air, especially in cold weather. In the first place, with from fifty to sixty passengers, it does not matter at what point the cold air is introduced, it will be felt by some of the passengers. The whole human race are in apprehension of taking cold, and just as soon as any draught is felt by any passenger, just at that moment they will attempt to shut the orifice through which it enters. The question comes back, Can not the air be admitted in such a way as not to be a discomfort to the passengers? It seems absolutely necessary that the current of cold air should be warmed before it enters the car. How can this be done with the least difficulty? There have been a great variety of plans proposed. There are systems of heating by warm air—air passed round the stove and heated sufficiently to give the requisite warmth to those in the car; also those by which the air is admitted near to the stove, so that the current, in passing into the car, will pass over the stove and become mingled with the hot air which is rising all round the stove, as is always the case in any apartment. I do not propose to give any decision in reference to which plan is the most desirable. The only thing I want to impress upon this audience is the extreme importance of admitting a sufficient quantity of air to keep it pure at all times. One of the most prolific causes of discomfort in traveling in sleeping-cars, and all kinds of cars, is the foulness of the atmosphere, in cold weather especially. In summer, the natural instinct of people to open the windows and admit fresh and cool air is so great, that there is not so much difficulty from that foulness which arises from a second breathing of air. There is not so much difficulty from that in summer as in winter, when the instinct of every body is to shut every orifice through which the cold air enters. So it seems there is more difficulty attending the ventilation of cars in winter than in summer. If the car-builders can only once realize that it is absolutely necessary that a quantity, at least not less than five cubic feet of air, per minute, must be admitted, we will begin to have some great improvement in the methods of ventilation. There have, of course, been a great variety of plans proposed, and, what is very curious, in nearly all the systems thus far adopted, and proposed, and patented, you will find there is abundant provision for exhausting air, but no provision for admitting it. I have had a good many people say to me, if I talk about the proper means of admitting air, "It will leak in through the crevices, and come in through the windows and doors." Suppose you admit that; you come to the conclusion that the better the workmanship of the car is, the worse is the ventilation; so we must build poor cars to have them well ventilated! It seems to me a more scientific method of getting at this would be for men when they build cars, to provide means for admitting air—to see that there are abundant means for its ad-

mission in such a manner as not to be a discomfort to the passengers. I hope gentlemen will discuss this subject, because the public are very much interested in it; and discuss it so thoroughly that we shall have some improvement in this matter of ventilation.

MR. F. D. ADAMS, Boston and Albany.—I confess my ignorance in regard to this matter of ventilation at once. It is a matter that, when I received the circular from the committee, I looked at with fear. I did not know what to say or what questions to attempt to answer, or what answers to make to those they had given; but I think Mr. Forney has made the subject appear to us to be one worthy of attention, at any rate. It has been thrust upon us in all manner of ways by various writers, and sometimes we have become almost digusted with it. There have been many suggestions made next to impossible to carry out; and it used to occur to me in reading them, that if these men knew more about building cars, they would talk less about their ventilation, and how easy it was. There are one or two things I would like to have our scientific mechanics explain to us how we are going to get over. One of them is this. To get at it in the most direct manner, we will say there is no difficulty in ventilating a house. Almost every body can get up some kind of ventilation for a house that is still and quiet, and we can make some calculation for the currents of air; we have no extra currents of air to contend with; we have got no vast amount of cinders, and smoke, and dust, which attends a railroad-train. Now, just as quick as we begin to make orifices to admit air, we are going to get in a torrent of smoke, cinders, and dust, and if we make an orifice to admit in a car five cubic feet per minute to a passenger, at a speed of 20 miles an hour—which some of our trains may run—and if we put that train up to 40 or 45 miles an hour, it must admit a vast deal more air; and my trouble is how we are going to adjust this matter to meet all these conditions with economy. I confess I do not know. I have thought of it a good deal. I confess to the importance of ventilation. I was quite pleased with the idea of Mr. Forney that if we are going to depend upon the orifices, or rather upon the cracks and open joints to admit fresh air, of course we encourage poor cars, which we all want to avoid. Our aim and ambition is now to increase the durability and fine workmanship of our cars. We try to emulate each other a little in building the best cars, perhaps, and I think that is very creditable. I think there was some ground, however, for the statement that the air would come in through the cracks. Years ago we had to depend largely upon outsiders to build our cars, and they used to make cracks enough in them, and they came in for repairs quick enough after they were built, and plenty of fresh air came in under the doors and through the windows and cracked panels, and various other places that might be named. That difficulty now seems to be obviated, and another one arises. We lack fresh air. There is no doubt about that. Now what I would like to have Mr. Forney or some other gentlemen explain to us is, what he proposes. Give us some idea, lay out some plan for us, and we will try it and carry it out if we can. We have tried various plans on our road, and the report of the committee referred in one case to those experiments. I don't know that it was the fact, but I rather drew the inference that those experiments were tried on our road. The fact seemed to be demonstrated that those cars that were provided with the end-wickets spoken of, that took in the fresh air under the hood or projection, cleared the air of impurities in a very short space of time; whereas those that had not, were a considerably longer time in getting the impurity out. If that is a good way, of course I do not see any objection to adopting it. There is no patent to it, and no objection on that score. Mr. Forney suggests the idea that we make an orifice that can not be closed. There seems to be a difficulty in that. When the weather is extremely cold, we do not want so much air; it makes us uncomfortable. I admit that we need just as much pure air; in other words, it would be as unsafe to breathe impure air in winter as it would be in summer; but if we make an orifice that can not be closed, there is no way of adjusting it. Perhaps it would be better to have it so you could not close it, because the generality of people that ride on railroads have a horror of currents of cold air; they had rather take upon their lungs something that will produce a fever than to feel a chill. Most every body will risk it rather than feel chilly; consequently, if we put a blind in there with stationary slats, it would remain so, and we should have to take at whatever speed we were running just as much air as was forced in, whereas if we were running at moderate speed, there might be just about enough forced in. We put in a wicket with an adjustable sash to close that opening partly or wholly if we choose to. We do not intend to run without having it partly open, although sometimes the passengers close it. We have adopted the plan of either cutting in the glass, "This is for ventilation," or painting it on, in the last ten or twelve cars we have built, which calls the attention of the passengers to the fact that it is for ventilation, and if they have any need for ventilation they let it alone. But passengers are just as notional as car-builders are in this matter. The blame is thrown upon the car-builders. We may produce all the facilities for ventilation there are in the world; if passengers will not use them, we can not get the cars ventilated. And there is no other way as I see, only to make a positive fixed opening that they can not close, so that they have got to take in the air whether they will or no. I would like to hear from other gentlemen in regard to this subject. I suppose most of us have not read these works on ventilation. The subject has not been presented, until within a few years past, to our mind; and we are not situated so we can have access to libraries where we can get works upon this question. Then, again, our attention has been taken up with other matters. I am ready to admit at once that I have not given the attention to ventilation this year, knowing it was to be brought up for discussion, that I ought to have done, because I have been on another committee which took up all the time I had to spare.

MR. A. STEINBACH, Philadelphia and Reading.—I do not know as I shall have any thing to say on the subject of ventilation exclusively. I was well pleased with the report of the committee, presented yesterday, particularly as it has classified the different points. I had intended to say a few words on one point of the report when that section, especially, would come up; and that is the manner of heating, and preventing the car from taking fire in case of accident. I thought when that came up, I might say a word or two. I was well pleased with the remarks of Mr. Forney on that question, and I, for one, acknowledge, as my friend Adams has done, that I am ignorant of the scientific manner of ventilation, or the quantity and proper mode to suit all purposes. But what I wanted to say, particularly, is this: we have, on our road, a method of heating and ventilation different, I think, from nearly all the other roads. We have our furnaces underneath our cars; we have no fire inside the cars. This answers for ventilation during, winter and summer—at all times; it can be regulated to any extent you wish. The air is distributed into our car right above the floor—right under the seats, and there is a register under each seat. The heated air, in winter, is brought in there and circulated in the car. We have no fire in the car, but have it outside. We have two furnaces suspended on rods underneath the car. In that way we bring in air sufficient, we think, for ventilation in winter, and for heating also. We have had that in use for five or six years, and we have found no difficulty in doing it, and very little complaint in regard to ventilation, although our road is a short one. We have no through-lines, or sleeping-cars our road. We are simply a short road, and run only local trains; but we run a good many of them, and I suppose we carry about as many passengers as any other road in the country, only a short distance; and we have had no difficulty with ventilation on our road. I am not prepared to say what quantity of fresh air a passenger ought or ought not to have in winter or summer; but I would say that the manner in which we bring the air into our cars is through the bottom. The air goes into the heater, and then into the cars. It is a matter of great importance; and I should like to hear the general experience of members on this point. The committee performed a great deal of labor, and have brought in an excellent report.

THE CHAIRMAN.—I would inquire if they have any special arrangement for preventing fire in case of accident?

MR. STEINBACH.—This furnace is cased in. We had an accident where a car ran off the track and over a bank, and there was no fire. Our furnaces are constructed in such a way, in double cases, that it is impossible for any fire to get out of them.

MR. W. R. DAVENPORT, Erie Car-Works.—This matter of ventilation is not so very difficult. The quantity of air required in a car is not so very great as we at first glance consider it to be. It is said we should give five cubic feet per passenger per minute. Now, taking the average number of passengers in a car at 40—I think that 40 will be about a fair average for each car—five cubic feet is only 200 cubic feet a minute for the whole 40 passengers. Now, certainly there is no difficulty in getting this quantity of air into a car per minute—not the least in the world. I figured it out to see. If we had a foot opening and were running at 20 miles an hour, we would put into that car 105,600 cubic feet in an hour, and nobody wants any such quantity as that. If we make a six-inch clear opening, and we receive air from the outside, supposing the atmosphere to be still and the train to be making 20 miles an hour, we will give each passenger a double dose, and more too. We will put into that car through a six-inch square clear opening 440 cubic feet a minute, which is more than double the amount required. We will say then that a six-inch circular, clear opening—an opening of six inches in diameter—will give us, if we put the air in at 20 miles an hour, just about the quantity that we require. The passengers do not object to warm air coming in. What they object to is cold air. Warm, pure air never made any body take cold or gave them any fever. Of course, air can be warmed and sent into a car just as pure as though it was cold. This matter is not impracticable at all, for we can take care of six inches diameter. Our friend Adams will take care of that without any difficulty. The point is, to pass that air over a warm surface so that it will come into the car at a temperature not below 65°. We do not want it 90° or 100°. If we can put it into the car at a temperature of 65, it will be all right. The animal warmth produced by the presence of 40 passengers in a car raises the temperature constantly, and if you send it in at 65 it will be 70 before it is got out again, even with our best ejector arrangements. I take a great deal of interest in this matter, because it is a matter that every body who gets into a car experiences the necessity of. We have some very excellent warming appliances now. We warm the feet of our passengers, and thus warm their whole bodies easily and nicely; but every one who has passed into a car warmed with some excellent appliances which I could name, has detected by the sense of smell the impurity of the air. The air in the car is warmed all right, but the arrangements for getting in pure air and getting out impure air are lost sight of, or left to chance. The only question is, to provide for receiving six cylindrical inches of pure air into a car—what we can get in going at 20 miles an hour. That will be a moderate rate of speed; and of course, if we were above that, the only risk is in the air coming in a little colder, and that can be regulated by a gauge over the opening, which will decrease the opening if we are running at a high rate of speed or against a high wind. The brakeman can receive his orders from the conductor to regulate the opening so as to receive a less amount of air, thus leaving a less surface for receiving the air, although we will get the same quantity because it comes in at a greater rate of speed. This will provide for warming the air sufficiently, so the passengers will not have any disposition to close the opening. I want to say one word in favor of the passengers, for certainly they do not object to pure air. They object to currents of cold air which shall give themselves or friends neuralgias and colds of every stripe and complexion. They had rather take the chance of breathing impure air than have a fit of sickness. It is not impracticable, by any manner of means. There is another matter that friend Adams is very right about, and that is the matter of getting into a car, in summer, a sufficient amount of pure air, free from cinders and dust. It is a matter that if this convention can provide for to-day, the members will each be entitled to a gold medal weighing a pound. It is a matter of the utmost importance. It is a matter which is next to an impossibility to do by any practical arrangement with our heavy palace cars. We have got to make our arra gements on top as far removed from the track as we can. We have got to get that air into the car free from dust and cinders, and got to do it in such a way as not to impede the draught of the car by the engine. That is a matter which we must take into account. We must consider our employers, and keep in mind that they will not uphold us in experiments which involve arrangements for ventilation so bulky and so complicated as to inter fere with the draught of the car. If we can devise any plan by which we can get an amount of fresh air into the car that will satisfy the passenger without disgusting our employers, we will merit a great deal at the hands of the public. I see no difficulty in providing for winter ventilation; but when it comes to summer ventilation, I allow it is beyond my depth.

MR. ADAMS, of the Boston and Albany.—I would like to say another word in relation to this. I did not think I should say any thing at first, but Mr. Davenport has opened my eyes a little to one thing that I think we should take a great deal of credit for. If it is a fact, as he says, which I can not see any reason to doubt, that 6 inches will admit a sufficient amount of air, and change the air every minute for forty passengers, it must be conceded at once that our cars are pretty well ventilated. I don't think any one can charge the B. & A. R.R. with not having well-ventilated cars. If it is true that we are producing that number of cubic feet, at the rate of 20 miles an hour, we are certainly getting a good deal more than is necessary. We have got air-openings in each end immediately over the windows in almost all the cars now on the road. There may be a few exceptions among some of the very old cars, but we have cut out a large quantity of the old ones, and orders were given when this method was introduced to bring all the cars into that arrangement as quickly as possible. We have an opening over each window, about 21 inches by 6, which makes something over two square feet of opening. It is not covered, either, with wire netting, to obstruct the wind or air. There is nothing but a clear hole, so the air will come in. The sparks do not come there at all. There are no cin-

ders, no smoke, and no dust; but the air comes in. There is no question about that. But I do not think it comes in with that force that it would if it was not protected at the end of the car by what we term a "hood," which gives a direction to the smoke and cinders—an inclination downward, leaving the space above that clear. So I think it must be readily admitted that we get an abundance of pure air according to that theory. But I admit it comes in, in the winter time, cold—cold enough so we want to shut them up, and they are shut up, and kept shut up in front, but not in the rear; so we are exhausting the air, and it draws upon the volume of air in the car. In the winter, it can be shut up close, or opened at any angle. Of course, if it is wholly open, it makes an aperture of a little over two feet. If that is closed up within an inch, or an inch and a half, and the rear ones all open, we get a very comfortable condition of the air in the car. I meet with that difficulty in the winter that has been spoken of here: passengers get up and go and shut them. The current of air, when it comes into the car, from the position of the wicket window, is carried immediately to the dome. It goes up to the ceiling of the car, and passes along the headline, and comes down with more or less volume at different points. About the third or fourth seat from that window, a person will feel a considerable current coming down. If we could obviate that difficulty in some way—if we could manage to distribute that air equally in the car without some very objectionable features, we should be glad to do it. But so far as bringing the air into the car is concerned, I have never seen any thing yet which is so good, unless Mr. Garey's plan may be better. I do not think there is much difference. I do not think he gets as much air as we do; still, there is not so much objection from the current in his as in our plan. It was thought at first we should be under the necessity of putting a wire screen over it; but we found there was no necessity for it, and we have settled down upon that ventilation, so far as we now know, as being as good a plan as we could adopt. In regard to the matter of warm air, I do not know of any better plan than Mr. Spear's operation of bringing it in around the stove. I do not know as that brings in a sufficient quantity—perhaps not. I have never seen any thing yet that I was fully satisfied with as to carrying a sufficient quantity of air into a car, and warming the car up to the right temperature. Mr. Davenport alluded to the fact that passengers did not object to the air so much as they did to its being cold. Now, I have noticed one thing in my own experience, that when persons sit in a room any length of time, they become more or less insensible to the change of air, so far as it becomes impure. The organ of smell is not as keen, consequently they do not observe the impurities as much as a man does that comes directly from out-doors into the car. They do not notice the fact that the air is impure, and, consequently, will close the ventilators. I do not know of any way of preventing their being closed, more or less, by sensitive persons. They will request the conductor, or some one else, to shut it, and consequently it gets closed up. One word more in regard to this plan of ventilation. After it was introduced on the first car, and pretty thoroughly tried on various trains, by various conductors, and under the eye of the superintendent, an order was given to make it a standard fixture on our road. One conductor has been on our road 29 years, and is the only one who objects to ventilation. I went into the car to see these wickets. I had not seen them since putting them in. He said, "What did you put those things in for—to make holes in the end of the car? You had better stop them up right off. I never want a hole in the end of a car on any account. I would stop up all the windows." Said I, "Would you stop up the doors?" "Yes, if they could get in anywhere else." He did not want them in, yet every other conductor likes the plan, and more or less of them take considerable pains to keep them adjusted. One other item Mr. Davenport alluded to, and that is having the orifice so as to adjust it to the temperature of the atmosphere. I don't know what experience others have had with conductors and brakemen; but I find it very difficult to get brakemen to do any thing in adjusting any ventilating arrangement. It is very difficult to get them to open or close the draughts of a stove, when necessary. They will have the stove red-hot, or let the fire go out. Now it is just so with ventilation You can not make brakemen take that into their minds. You may tell them a hundred times a day, and they will never go and do it. We have automatic brakes on our road now, and the brakemen have not got any thing to do with them; but we can not get any more done than we could before. I have heard the argument used for the Westinghouse brake, that if they were used, the brakemen could attend to ventilation, the registers, and lamps; but the more provision you make to accommodate them, and give them a chance to wait upon the passengers, the less they will do.

MR. FORNEY.—There is a very excellent plan which Mr. Garey has adopted on his road. I hope he will describe to the association its construction and operation.

MR. L. GAREY, of the New-York & Harlem.—It is simply openings at each end of the car, with air taken in over the platform through the roof of the car. They are covered with wire screens, admitting the air at the forward end, and exhausting it at the rear end. It is very simple and not expensive, and not liable to get out of order, and will supply all the air required, and will exhaust all that is necessary to keep the air pure in the car, let it be any kind of weather, or if the car is in motion, say from 6 to 30 miles an hour. There is no provision for warming the air. It is simply for admitting and exhausting it. I think it admits the least dust by taking the air from the platform near the roof; with a hood projecting down from the roof, there is a less current of air at that point, and consequently less dust than lower down over the window or the top sashes in the door where we used to take it. The matter of ventilation is one that has been agitated for a great many years, and, if I am not mistaken, the Board of Education, of Massachusetts, have thought it expedient to introduce into the public schools here the theory of educating the young upon the necessity of pure air; and I think when we get our people educated on this subject, we shall have very little difficulty in furnishing our public cars, halls, and public places with all the pure air they may need.

MR. FORNEY.—I always knew these Yankees were great people, and I am convinced, from what Mr. Garey says, that they are greater than I thought they were, and I am half sorry I am not one of them. I rose to say a few words in regard to a system of ventilation on the Illinois Central Road, when I was employed on the line. They used the ordinary Spear stove among the rest. They had other patterns. We surrounded the stove with a sheet-iron casing, and to the bottom of the casing they attached a pipe which communicated with the top of the car. On the top of the car they at one time used the fixed hood common to the Spear stove, but it was found not to admit air with certainty, and they therefore substituted for that fixed hood a hood which had a vane attached to it, and which revolved. The effect of that was, in running with a strong side wind, the vane would adjust the position of the hood in the direction of the wind, so it would always admit a more equal quantity of air than is possible with a fixed hood. After using it a short time, they found, upon making an aperture as large as was used with the fixed hood, too much air was admitted, and they cut it down; and when I left there, they were using a hood the mouth of which was 4 x 10 inches, which they said admitted all the air that was necessary. This was carried down to the sheet-iron casing round the stove, and there was a flue which ran the length of the car and had registers for admitting the air through the length of the car. Persons, when they got warm, would close the register, and then sit there until they froze before it would occur to them to open it again. And, inasmuch as it was in an inconvenient place to reach, it was impossible for the railroad men to tend them. On the North-Western road, they removed the covers of the registers in the flue. But the best plan would be to cover the flues with sheet-iron, and perforate it with small holes that would distribute the air more equally, and not incommode the passengers. There should be more registers at the further end of the car than near the stove. I simply suggest this plan as being one that has operated very well, and which I think is worthy of consideration.

MR. R. HITCHCOCK, Conn. River R.R.—There seems to be a diversity of opinion as to the best method of ventilating and warming passenger-cars. It has usually been my custom, in the absence of knowledge, to inquire of those that I think best understand what I want to ascertain. And I would recommend in this case, that this association do the same. There are parties that build cars, and put them upon our railroads, and which depend upon the luxuries afforded in excess of what is furnished by railway companies, for their success. I would recommend that this convention should make inquiries, and see what method of ventilation and warming such parties have introduced. I refer particularly to the Pullman Palace Car Company. It is well known that they must furnish better accommodation, better ventilation, and better warmed cars than railroad companies do for their passengers, in order to get their custom. I do not see how we can agree as a body where there is such a diversity of opinion. I do not expect that air can be taken in and sent out without taking in dust. And in my own opinion, the only method that can be accomplished successfully is an exhaust and supply.

MR. V. D. PERRY, Hartford, Prov., and Fishkill.—As Mr. Hitchcock says, there seems to be a diversity of opinion in regard to this matter, and probably always will be. I am frank to say I do not believe any means can be devised to thoroughly ventilate a railway passenger-car while in motion over our roads. If our tracks could be wholly above ground and through an open country, perhaps the theory of Mr. Davenport might be correct—that we could get air enough through a 6-inch surface to supply a car-load of 40 passengers; but as we are now running over an embankment, and perhaps the next moment through a deep cut for miles, that little orifice would not amount to any thing, and would be little better than nothing, in my opinion. The currents of air are different as we travel over the different roads in the country, and it is impossible, in my opinion, to thoroughly ventilate cars. I remember last summer, during hot weather, I was coming from Washington. We had a passenger-car on the train with openings over the end windows, and the passengers almost suffocated in that car. They were complaining constantly, while there were openings enough, according to Mr. Davenport's idea, to admit 50,000 cubic feet of air a minute, if it came through in proportion to the size of the openings, as he claims; but as I said, the passengers were constantly complaining, through the whole trip, of suffocation and heat. It was quite dusty at the time; so much so, there were but few windows open. That is what leads me to make the remark that, in my opinion, no means can be devised to thoroughly ventilate a passenger-car.

MR. DAVENPORT.—I think the difficulty in that case was, the air was too hot all round.

MR. H. O. WADLIE, Illinois Central.—Perhaps it will look a great deal like egotism on my part to undertake to instruct the master car-builders on heating and ventilation. There are, however, some few things that have been mentioned here, that it has occurred to me there may, perhaps, be a misunderstanding about. My friend Davenport refers to an opening six inches in diameter. My friend Adams thinks his cars are well ventilated because they have a larger opening than that. But do these gentlemen take into consideration the different positions in which the orifices are situated? As I understand, Mr. Davenport proposes to have an orifice six inches in diameter, under the full pressure of a current of air with the car moving against the wind at 20 miles an hour. My friend Adams has introduced at the end of his car larger orifices, but he has another car immediately in front of it which forms, to a certain extent, a vacuum there, and therefore he does not get the same amount of pressure per inch that we have in the other circumstances, making a vast difference in the amount of air that is introduced under the different systems, with the train moving at the same rate of speed. My friend, Mr. Forney, suggests that perhaps the best method of testing the purity of air was the sense of smell. It has already been remarked here that that was no criterion to go by. And, indeed, I think any one, with a moment's thought, will agree to it; from the fact, if you take a man who is habitually confined in an office, for instance, and another one who, we will say, is employed in a tan-yard, and put them upon the same seat, it will be a very difficult matter to ventilate a car to suit both of them. It may be a matter of education, however, and when we get our passengers that we carry over the road educated up to our standard, then we can do something in the way of introducing air to suit all at a time. I would simply allude to the method we are using now for warming and ventilating cars. In the cars I am now building, I use the system described by Mr. Adams as the Spear system, with the addition mentioned by Mr. Forney, of carrying what we term a "hot-air flue" from the stove along the side of a car, using registers. In addition to that, we place in the monitor deck, at each end, a sash that will swing about on two exhaust hoods, as we term them, 8 inches in diameter. This sash can be adjusted and will effectually exhaust the air in a short time. When we first turned these out, one plan was to build a good fire in the stove, and send a man on top of the car to close the stove-pipe, open the arrangement for ventilation, and see the effect it would have in the car; and it cleared the car very effectually from the smoke. We also introduced air at the end of the car for summer ventilation, the same as spoken of by Mr. Adams, who has described it, with the exception that we use a netting over the opening, and raise the sash the same as the ordinary sash of the car is raised. The object of putting on the netting and raising the sash in this manner is, not to deflect the current of air, but to let it diffuse itself through the car without creating a current, which has the effect of rising and passing down upon the heads of the passengers. We think by the screen we partially break the heavy current of air and distribute it so it mingles more readily with the air in the car, and avoids a current.

MR. R. HITCHCOCK, Connecticut River R.R.—I think there is an objection to letting in so much air at one place in these openings over the windows. I should prefer to let it in in small quantities, and distributing it over the car more. I have sat very often near one of these openings in the third or fourth seat, and experienced a cold blast in winter and sometimes in sum-

mer. It is not pleasant to have so much air come in. If the openings must be at the end, I would say put in more of them and make them smaller.

MR. I. W. VAN HOUTEN, Pennsylvania R.R.—I am prepared to say that, with my experience of 30 years as connected with car-building, I doubt very much whether we have yet arrived at that time when we can definitely fix the best mode of ventilating railroad cars. I acknowledge that I have not been fully educated upon that point. I have been educated to know by experience that ventilation is required; and the next point is, How we can get a proper amount to suit, and what should be given to each passenger in a car? We can average that. A passenger may ride in a car that will want a vast amount, sufficient to kill the passenger sitting next to him. Now, we don't want to give one passenger so much as to kill another, but we want to give all sufficient for their comfort. Different modes have been suggested to get this ventilation into the car. Mr. Adams's plan is to give two 6 x 20 apertures at the top. My friend Wadlie does not approve of that method. I think I agree with him. It may come in at the right place, but it does not properly distribute itself as it should do. I think the fresh air should be brought in at the bottom of the car where it can distribute itself, and give an opportunity for the lighter air to rise to the top. It seems to me, if it comes in at the top, it must, as it is the heaviest air, press down the foul air upon the heads of the passengers, which I think should be avoided. You want the fresh air to distribute itself near the bottom of the car, from as many openings as you see fit to make. I think we are not yet prepared to say, as a convention, what is the best mode of ventilation; and therefore I move that this question of ventilation be postponed until our next annual meeting; other questions remain in the hands of the committee who now have charge of it. There may be matters to come up which the experience of every gentleman here may bring out new ideas upon, and I want to get the best ideas we can; and if any ideas can be brought out, let the thing go over. Our final action upon it to-day, may, twelve months hence, not be what we shall want to suggest then.

MR. W. E. CHAMBERLAIN, Boston and Albany.—As one of that committee, I will say it will be necessary to receive answers from more of the master car-builders, next year, than we have received in the year past, to the circulars on ventilation. I believe we only received communications from twenty-seven different roads. It is no use to continue the committee for another year unless the master car-builders are going to put the shoulder to the wheel and keep it rolling. We know they can do something—try experiments on their own roads and report the results, and it will be easy for the committee to come together, or try the same experiments on their roads.

MR. I. W. VAN HOUTEN, Penn. Railroad.—I am not positive whether I answered the circular on ventilation or not, but I presume I did not, and therefore I can more readily say that the committee may take it for granted that any master car-builder who does not answer the circular, has no opinion on ventilation; and if twenty-seven master car-builders have an opinion, and answer the circulars of the c mmittee, and if that is all that can be got at the expiration of another year, this association may properly accept the opinion of the twenty-seven, and leave us gentlemen who have no opinion, to abide the result.

MR. W. E. CHAMBERLAIN.—I would like that to be understood, if only twenty-seven give answers next year, the rest are to keep their seats. If the rest do not know any thing about ventilation, let them keep still.

MR. F. D. ADAMS.—That same trouble runs through all these committees. The circulars are not answered as they ought to be, and I wish gentlemen might feel a little more interest in this matter. It seems to me they do not realize the importance of it. Now what committees are appointed for is, to bring in some intelligent reports here; and in order to do that, they have got to get information from members, and compare notes. We sent out circulars on all the different subjects, asking them to answer certain questions to the best of their ability. We do not expect they are going to give us an elaborate essay on these things, but we want something; we want some kind of information. I am not willing to admit but that the most of these car-builders know something. They have had years of experience, therefore they can give us some ideas!

The motion of MR. VAN HOUTEN was then agreed to, and the subject postponed until the next annual meeting, and the committee continued.

SUNDRY COMMITTEES.

The Chair announced the appointment of the following committees:

On Resolutions.—Messrs. M. N. Forney, L. H. Cummings, I. W. Van Houten.

On the Place of next Meeting.—Messrs. D. Hoit, H. O. Wadlie, Hugh Gray.

INVITATIONS.

MR. ADAMS, from the Committee on Communications, presented and read an invitation from Henry C. Sherburne, Chairman of Executive Committee, appointed at a meeting of sundry merchants and business men of Boston, inviting the members of the association to attend the Boston Theatre this evening, to a steamboat excursion in the harbor to-morrow afternoon, and a ride in the suburbs on Friday afternoon, which several invitations were accepted.

MR. ADAMS, from the Committee on Communications, presented a communication from A. A. Folsom, Secretary of the Boston Association of Railroad Superintendents, extending to the master car-builders the courtesies of their various roads during their stay in the city. The communication was accepted with thanks, and laid on the table for the time being.

MR. ADAMS also read an invitation from sundry merchants and manufacturers of New-York, inviting the association to a dinner and drive at Newport, R. I., on Saturday, June 14th, and also tendering hospitalities on board the boat on their way to New-York. Invitation accepted.

A CORRECTION.

On motion of MR. VAN HOUTEN, the Chair appointed Mr. W. R. Davenport, in place of W. H. Dunham, on the Committee on Business for the Next Meeting, Mr. Dunham not being in attendance on the present convention.

REPORT OF COMMITTEE ON ASSESSMENT.

The Secretary presented the following report on behalf of the Committee on Assessment:

Report.

To the Master Car-Builders' Association:

GENTLEMEN: Your committee beg leave to report, recommending that an assessment of five dollars be made upon each member of this association to defray the expenses of the current year.

Respectfully submitted.

S. A. DAVIS,
W. R. DAVENPORT,
JAMES MCGEE, } *Committee.*

The report was agreed to.

AXLES, JOURNALS, OIL-BOXES, AND CENTRE-PLATES.

THE CHAIR called for the report of the committee, appointed at the last meeting on the subject of Axles, Journals, Oil-Boxes, and Centre-Plates, the committee consisting of Messrs. Kirby, Adams, and Hoit.

MR. ADAMS read the report of the committee as published in THE CAR-BUILDER and *Railroad Gazette* in the month of March last, as follows:

Report.

To the Master Car-Builders' Association:

GENTLEMEN: Your committee, appointed at the last annual convention of the Association, held in the city of St. Louis, and to which was assigned the duty of collecting information in regard to railway axles, oil-boxes, and journal-bearings, with the view of determining the most suitable form and size of the same to be adopted as a uniform standard by all railroads, beg leave respectfully to report:

That for the purpose of obtaining such information from the most reliable sources, your committee have sent circulars as far as practicable to all master car-builders and master mechanics connected with the car departments of railroads, and have received replies from the majority of those to whom such circulars were sent, accompanied in some cases with descriptions of practical tests made of different sized journals, and recommending the adoption of a larger journal and oil-box than are now generally used; although in some of the replies the size and kind of oil-box used by the roads with which the parties are connected, are given with the statement that they were satisfactory. It is to be remarked, however, that all the reports received from parties connected with the large trunk-lines favor an increased size of axle and journal-box, while the reports which favor the present size are from parties connected with smaller roads.

Your committee, after a careful investigation of the subject, have arrived at the conclusion that a larger axle, a longer and larger journal, and of course larger oil-boxes, are desirable. In coming to this conclusion, they have given greater heed to the reports received from the leading trunk-lines of road throughout the country, for the reason that such lines use a much larger number and a greater variety of cars than the smaller and branch lines, and therefore the observation and experience of those who have charge of the car repairs on the long lines have more value than that of master car-builders whose opportunities of comparing their own cars with those of other roads are necessarily more limited.

Your committee are of opinion that an increase in the size of the parts named would be a very great advantage to all roads, and this in a great variety of ways. A large axle would tend to lessen its liability to break; an increase in the length and diameter of journals would distribute the friction over a larger surface, facilitate the lubrication, and avoid delays by hot boxes—a source of very frequent annoyance and trouble. A uniform system once adopted and adhered to by every road, would diminish the aggregate cost of repairs very materially. Other arguments in favor of a standard system might be urged by your committee, but the leading points above indicated will, in our judgment, be sufficient to convince all practical railroad men of the great benefit to be derived from its adoption.

Guided by the best information to be obtained from the most experienced and practical railway mechanics of the country, your committee would therefore recommend, and strongly urge the association to adopt, the following specified sizes of journals and axles for all new work, both for passenger and freight service, and also for old cars as far as practicable:

Length of axle, between outside collars, 6 ft. 10 in.
Thickness of collars, $\frac{5}{8}$ inch.
Diameter of axle at wheel-seat, $4\frac{1}{2}$ inches.
Diameter of axle at centre, 4 inches.
Length of journal, 7 inches.
Diameter of journal, $3\frac{1}{2}$ inches.

We would also recommend an oil-box with a uniform journal-bearing and key, as represented in the accompanying cut, making one uniform core-box for all trucks, whether iron or wood, with jaw or without. All of which is respectfully submitted.

F. D. ADAMS, Boston and Albany R.R.,
D. HOIT, Toledo, Wabash, and Western R.R.,
JOHN KIRBY, Lake Shore and Michigan Southern R.R., *Committee.*

MR. ADAMS.—I would like to say, in relation to this, that although I signed this report as one of the committee, I was not myself fully satisfied with it. I was extremely anxious to state to the committee, when this report was made, that I should take the liberty of protesting a little against it myself personally. I am anxious for a larger-sized journal in diameter.

On motion, the report was received.

MR. VAN HOUTEN.—The convention has now received the report, and we know what the committee recommend; and in order to give the members an opportunity to reflect over this matter, I move that the further consideration of the question be postponed, and made the special order for to-morrow morning, at ten o'clock.

After some little discussion, the question was put, and the motion lost.

MR. WILLIAM JOHNSON, Erie Railway.—This matter has been before the members of the association in print for three months. It has been in almost all the papers, and every member must have made up his mind on one or two particular points. I think it unnecessary to go into any lengthy discussion upon it, but I would like to hear some remarks from the different gentlemen present. I move that the length and size of axle that the committee have adopted be the standard size of this association.

MR. JAMES MCGEE, Pittsburg, Cincinnati, and St. Louis Railroad.—I would like to ask of the committee recommending this length of axle, if it was made to conform to any large number of trucks now in use, or whether it is a new length entirely? It is a little out of the length to suit a large number of cars with which I am familiar, and I would like to know if there is any other large number of trucks that it will suit—simply the length of axle without regard to the journals?

MR. F. D. ADAMS.—To relieve Mr. McGee's mind on that matter, I will simply say that I do not think the committee considered that they were to take into account the length of the axles now used on any particular roads. My own personal opinion in the matter was, that in coming to the conclusion to recommend some size for adoption by the convention, we should utterly disregard any stock that was on the roads, and that was what we wanted to arrive at by our circular; but we did not arrive at it except in a very few cases. We asked the question simply and plainly as it could be put: What would you use for a standard axle if there were no axles in use? hoping in that way to get at the experience of all master car-builders. We desired them to state in their answers what size they thought would be best, without reference to any thing that was already in existence; and in making our recommendation, we have fixed upon the length we thought most desirable to have as the standard length, without regard to altering the width of our trucks. But to remove any difficulty that may exist in the mind of any person, I would say that we do not propose to alter any of the trucks now running. We do not recommend that; we do not advise it in any way; but we do propose, if we can establish a standard axle to be universally adopted by all the railroads in the country, to make all axles from the time of its adoption

according to that standard, leaving our old stock to run just as long as it will. When those old axles begin to fail, the question will come up at once: How are you going to meet the wants of these old cars? They are not all going to decay at once. The axles are not all going to give out at once. We propose to do it in this way, if we have no axles on hand—and we would not advise any one to make any new ones of that kind—take five cars, for instance, or ten, if it is a large road; take those trucks out, take out the axles, and keep them in stock to supply the wants of the old cars, and replace or remodel those trucks and fit them up with the new standard axle. You have then put ten of your old cars into the new standard system, and you will have forty axles to supply your other cars; and continue doing that from year to year until they are all altered over; a few at a time, and at the same time building all our new cars right along upon our standard plan. In this way, we thought we should accomplish the purpose we aim at.

MR. L. GAREY.—I have a little statistical information bearing on this subject which it may, perhaps, be advisable to present at this time, as follows:

"The total number of cars on broad and standard-gauge steam-roads in the United States and Canada, at the close of the fiscal year in 1871, was:

Eight-wheel cars	193,767	
Four-wheel cars	58,355	252,122

"There are in the United States and Canada, 03 car manufacturing establishments, which have built, during the year ending May 31st, 1873:

Cars for passenger-trains	863	
Revenue cars (various)	35,531	
Construction cars	371	36,765

"Cars built by railroad companies during the year ending May 31st, 1873:

For passenger-trains	644	
Revenue cars (various)	20,405	
Construction cars	1,296	22,345
Total		59,110

"If we add to the above estimates of cars on hand in 1871, and manufactured in 1872–3, half the latter number for the six months intervening between the close of the fiscal year 1871 and the 1st of June, 1872, we shall have a total of 340,667 cars, of all kinds, at the present time, exclusive of narrow-gauge cars."

I have collected this information to show that it would not be so difficult to change the axle as many suppose. If all the new cars that are built from the time the size of the axle has been decided, are furnished with that kind of axle, it will take but a very short time to get a great part of our rolling-stock equipped with it. I have here some samples of large journals which have been running for some length of time. Here is a journal in which was laid a very thin coating of lead, and it was placed under a heavy sleeping-car. It was run 27,768 miles, between New-York and Buffalo, and you can see what the wear was during that time. It has a bearing for a journal of 4 by 7 inches. I think it doubtful if it would have been possible to run a $5\frac{1}{2}$ by $3\frac{1}{4}$-inch bearing during that length of time without renewing it at least once. I have some other journal-bearings here, one for a $3\frac{1}{2}$ by $6\frac{1}{2}$ journal. I had one or two cars fitted up with a $3\frac{1}{4}$ by $5\frac{1}{2}$-inch journal, and under the same car, I placed a $3\frac{1}{2}$ by $6\frac{1}{2}$, and $3\frac{3}{4}$ by 7-inch journal. I had these bearings cast from metal 7 parts copper and 1 part tin, all poured from the same crucible, to be sure that there was no advantage obtained by one over the other. They were placed under cars doing the same service, and had the same attention, and the same lubricator; and I find that in running about 28,000 miles, we have displaced from the $5\frac{1}{2}$ by $3\frac{1}{4}$, by friction, 5 pounds from the bearings; from the $3\frac{1}{2}$ by $6\frac{1}{2}$, we have displaced 3 pounds from the bearings; from $3\frac{3}{4}$ by 7 inch, we have displaced $2\frac{1}{4}$ pounds from the bearings. The wear upon the journal has been, on the $3\frac{1}{4}$ by $5\frac{1}{2}$, $\frac{1}{32}$ part of an inch; on the $3\frac{1}{2}$ by $6\frac{1}{2}$, $\frac{1}{64}$ part of inch; on the $3\frac{3}{4}$ by 7, $\frac{1}{100}$ part of inch. This appears conclusive to my mind, so far as it goes, that we must have a larger journal than $5\frac{1}{2}$ by $3\frac{1}{4}$ to do our service economically. If we displace 5 pounds from the bearings on a journal $3\frac{1}{4}$ by $5\frac{1}{2}$, and only $2\frac{1}{4}$ pounds from the $3\frac{3}{4}$ by 7-inch journal, if I am not mistaken, it shows that the friction is more on the small journal than on the large. That is, you wear more on the journal, and more on the journal bearings, and if there is less friction, it certainly must require less power to move the train. I hope there have been other trials of this kind made. I have made these tests very carefully, giving the same attention to all of them.

MR. F. D. ADAMS, Boston and Albany.—I would now like to move an amendment to the motion before us by making the diameter of the journal 4 inches instead $3\frac{1}{2}$, and, of course, increasing the wheel-seat correspondingly, making $4\frac{7}{8}$ inches finished. It certainly should not be less than this, and I do not know that I should have any objections to making it 5 inches.

MR. I. W. VAN HOUTEN, Penn. R.R.—I hope this amendment will not prevail. There are two or three questions which it is proper for us to consider before we vote to increase the size of the journal to 4 inches in diameter. The first proper question would seem to be, Who are the great owners of the vast number of cars that have been reported as having been built during the last year by the different railroads of the country? I do not wish to speak disrespectfully of the smaller roads, because we were all small once ourselves; but the question is, Who is it that owns tens of thousands of these cars that have been referred to here as now running in the United States? The next question is, What has been the experience of the gentlemen having charge of that large amount of rolling-stock? And the third question is, What is the size of axle, and the length and diameter of journal, now used on these tens of thousands of cars? It appears to me these are three important questions for us to consider. My friend Mr. Garey has exhibited bearings that have been run, as he says, 28,000 miles on a 4-inch journal, and it appears to be, to a certain extent, pretty good evidence that that has been a very good size of journal. But I want to say to you—and when I speak about this thing, I want it to be understood that I speak knowing what I say, so far as that is concerned—that I can produce a car with a journal 7 inches long and $3\frac{1}{2}$ in diameter, which has run 89,590 miles. Then there is another point. I would ask any gentlemen in this convention, whether in his experience he has ever found an axle to break in the journal, and whether those journals do not run until they are so far worn that they are no longer fit for service, or until the iron becomes crystallized, as scientific men say, so that they are no longer safe? I repeat my question, did any master car-builder ever know an axle to break in the journal?

MR. W. E. CHAMBERLAIN.—If it will be any accommodation to the gentleman, I can send down to the shop, and I think I can furnish half a dozen.

MR. C. A. SMITH.—I could show him some in the Erie Railway shops.

MR. VAN HOUTEN.—I have never seen one break there unless there had been some neglect, and the journal had become heated. I have seen a good many axles break outside of the wheel. I have seen a good many break inside, and lighter as well as heavier axles; but I have never known one to break in the journal, unless it had been allowed to run and get heated—the iron burnt off, I might say. I wish to be distinctly understood that my opinion in regard to the size of journals is not influenced by the fact that I happen to be, fortunately or unfortunately, connected with one of the leading roads; but I say that if we should adopt a 4-inch journal, which is larger than one half or two thirds of the axles now in use, and which have proved satisfactory, and run with entire success, our action here would amount to nothing. If you could not get these parties, whose experience during the last ten or fifteen years tells them that a certain size of axle which they have adopted is a proper size, to throw their tens of thousands of axles away, and adopt a 4-inch journal, it is of no use to talk about it. Don't let us go so far on one side that our action here will be of no account. Let us take into consideration, as I said before, all these matters; take into consideration the tens of thousands, and I might say, hundreds of thousands almost, of cars that are owned or controlled and run by the large roads. It would be of no use for me to tell the managers of my road that they have made a mistake for fifteen years, and that this Car-Builders' Association has just found it out. They would naturally come back on me and say, "Why, Mr. Van Houten, how happens it that, with your thirty years' experience, you have not found this out before?" I can find cars that have run successfully with journals $2\frac{1}{2}$ by 5 inches, and I have carried hundreds of thousands of passengers. I admit that the cars were much lighter. We build our cars heavier now, but I want the gentlemen to bear in mind one fact, that, while we have increased the weight very materially of our passenger-cars, we have increased the strength and safety of those heavy cars all over the country almost, by using a six-wheel truck. We have three axles with $3\frac{1}{2}$-inch journals to do the work that two axles did before. I consider $3\frac{1}{2}$ by 5-inch journals large enough for all purposes.

MR. L. GAREY.—My impression is, that Mr. Van Houten and some others here may be laboring under a mistake in regard to this matter, and there is one thing in regard to which I would like to know whether I am correct or not. I think this association has nothing to do with the roads adopting what we recommend here. Is is simply the judgment of the members of this association. They have nothing to do with the question, whether this or that or the other road will adopt their recommendation; but we want to place at this time on record what, in the opinion of the members here, is the best length of journal and size of axle for service on the cars in this country. I think the consideration should be thrown out entirely, whether any body will adopt it; but we should place ourselves on record, so that, if any of us should live fifty years from now, we could look back and say that we were right once in our lives, and not be placed in the position in which some of our learned men are to-day, who were applied to when the electric telegraph was invented, to know if it was safe to run those wires through a city, and gave their opinion that it would be suicide to stretch a telegraphic wire across a building of any kind, that it would be sure to be struck by lightning, and every one in it killed! Those men are living to-day, and are at the head of some of our colleges. Now, if they make mistakes, we should not be ashamed to admit that with thirty years' experience, simply practical experience, with very little theoretical knowledge in the matter, we have been in error. I will admit, any time, that I have been in error, as soon as I am convinced that the fact is so. I hope the gentlemen will not adopt any thing because they think the Pennsylvania road, or the Erie road, or the New-York Central road, or any other railroad will adopt it, but recommend something that will be right, if it is never adopted. That is my idea of this question.

MR. J. W. PHILBRICK, Maine Central.—I only want to say just this, that I think we are here for a practical purpose. We want to ascertain what is the best thing to be used, and in doing that, we want to get the benefit of the experience and wisdom of the Master Mechanics' Association, who had the same subject before them; and when we can combine what we think best, and what they think best, we must then, to make it practical, lay the subject before our railroad managers, and get them to adopt the standard which we recommend. We know that we are running axles too small, and we are anxious to get something better, and I want our recommendation to be put in such shape that some practical good will result from it. Let us, therefore, take the report which is now before us, and the report of the committee of the Master Mechanics' Association, put them together, and make the best report possible, so that we can present it to the superintendents and managers of the various roads, that we may in the end get something we can use. I move that the committee that is here from the Master Mechanics' Association be requested to present their report. If it is necessary to move to lay the question on the table, I will do so; but if that formality is waived, I will move directly that the committee be requested to give their report now.

MR. I. W. VAN HOUTEN.—We are here to transact our own business. I say, with the utmost respect, that we do not ask their report, but I desire that our committee on axles may be instructed to confer with the committee from the Master Mechanics' Association. Let them talk over the matter together, and then come in with a joint report.

MR. W. E. CHAMBERLAIN.—I think this association does want the practical knowledge and experience of the Master Mechanics.

MR. I. W. VAN HOUTEN.—I have not said we did not. On the contrary, I say we do; but I say let us get it by a proper conference between the respective committees.

MR. W. E. CHAMBERLAIN.—I think it is necessary to have it come out here before the convention, so that every member can see what view the Master Mechanics have taken in regard to the matter.

MR. J. W. PHILBRICK.—My only objection is, that if these committees are to come together, it will be necessary for our committee to make up a new report, which would carry the subject along another year. If it could be presented here, and if the matter could be discussed, we could do some work this year, which otherwise would have to be postponed until our next session.

MR. I. W. VAN HOUTEN.—I will change my motion to meet the views of my friend, and move that the present committee on car-axles be continued until our next stated meeting, and that during that time they confer, and act in conjunction with the committee of the Master Mechanics' Association.

MR. J. W. PHILBRICK.—If that report can be brought in here, and we can have a discussion, then the question before us would be as to recommending a specific size of journal. We are to vote upon that question; and here is another committee who have looked into it, and have something to say upon it, which I think is worthy of attention and should become part of the discussion, and then we shall be ready to vote whether the diameter of the journal shall be 4 inches or something else. We are to vote upon it; that action is to be taken by this meeting, and not by the committee of master mechanics. I do not wish to press it, but that is the reason why I made the motion.

MR. L. GAREY.—I am aware that all the information we can get will not inform us any more than we ought to be informed on this subject. I hope we shall request our committee to confer with the committee from the other association, that we may have all the information upon this subject that they can give us, and if I get any more than I want, I am willing to distribute it among the members.

The question was then put on the motion to request the committee of the Master Mechanics' Association to read their report, and it was carried.

MR. M. N. FORNEY, of the Master Mechanics' Association.—We were appointed to consider the axle question, but knowing that a committee to consider the same question had been appointed by your association, our committee thought it would be unwise to recommend any specific size, but that we should request our association to authorize us to confer with your committee, and we did so. We made a report to that association, of which the following is a copy:

Mr. Forney then read the report.

MR. I. W. VAN HOUTEN.—I happen to know all about that thing. I have read it all through. I happen to know that the master mechanics asked to have our committee confer with theirs, and that was the ground upon which I made the motion, and stated that we did not ask to have that report come in here, because they are not ready to submit it. This thing is to be further considered by their committee, conferring, as they solicited, with the committee from this association. I did not vote either way on the question of asking the master mechanics to present that report to this meeting, and therefore I move the reconsideration of the vote just taken to ask the master mechanics to bring their report here for our consideration and discussion. If that motion is carried, I have another motion to offer.

THE CHAIR.—As I understand it, this communication has been presented only as part of the discussion. It is for our information, the same as we would accept information from any one of our own members.

MR. VAN HOUTEN.—I would ask Mr. Forney if the master mechanics did not ask that this association appoint a committee to confer with their committee on this subject?

MR FORNEY.—There was a resolution at the end of this report which I did not read, which covers that ground. It was resolved, first, that the committee be continued, and that it be authorized to confer with a committee appointed by the Master Car-Builders' Association for the same purpose, and report at the next meeting.

MR VAN HOUTEN.—That is the point. That is all I want to know. They respectfully come to this convention, asking that we appoint a similar committee to consider this question of axles, which committee, after having considered the question, would submit something to both associations as the recommendation of the majority of those combined committees.

MR. FORNEY.—As I stated before, it occurred to the committee of the Master Mechanics' Association that if they made a report recommending a size entirely different from that recommended by the committee of this association, it would, of course, create a great deal of confusion, and to avoid that, we requested our association to authorize us to confer with the committee of this body.

MR. VAN HOUTEN.—If this convention is prepared to discuss the matter of axles, and recommend by their votes a certain size of axle, without showing a proper respect and regard for the master mechanics with reference to what they have asked us to do, I wish to say that you are at liberty to do it, but I am not in; because I have more respect for their judgment, and more regard for what common courtesy requires, than to do that.

The further consideration of the subject was then postponed until 10 o'clock to-morrow morning; and the committee authorized to confer with the committee of the Master Mechanics' Association.

TRUCK AND CAR-BODY CHECK-CHAINS.

THE CHAIR called for the report of the Committee on Truck and Car-Body Check-Chains, the committee consisting of Messrs. C. Millar, W. J. Calais, and J. N. King.

The Secretary, on behalf of the committee, presented and read the report, which was signed by the chairman only—Mr. Millar.

MR. W. J. CALAIS, Wil., Col., and Augusta, stated that there had been no conference between the members of the committee, and that the report was merely the expression of the views of the chairman, Mr. Millar. He (Mr. Calais) did not concur in these views, and would suggest that a new committee be appointed, unless, in the absence of Mr. Millar, some one could be substituted in his place.

A motion to substitute another member was made and carried; and the Chair appointed Mr. H. O. Wadlie, of the Illinois Central. The report was then recommitted, and the committee continued.

On motion of Mr. J. F. Elder, of the Penn. R.R., it was

Resolved, That no patentee or supply agent shall be allowed to exhibit or discuss his wares in the hall during the sessions of the convention.

On motion, the convention adjourned until 9 o'clock on Friday morning.

THIRD DAY'S PROCEEDINGS.

The convention assembled pursuant to adjournment, and was called to order by the Chair.

On motion, the reading of the minutes of yesterday's proceedings was dispensed with.

ROOMS OF THE ASSOCIATION IN NEW-YORK.

MR. L. GAREY, New-York and Harlem, called the attention of the convention to the subject of the rooms of the association in New-York. These rooms were opened on the 12th of December last, and were designed to be used as an exchange or place of resort for members of the association and railroad men generally visiting the city; and also as a place for the exhibition of models and drawings, and for the holding of meetings for discussion and consultation. A register was kept at these rooms, and the names of 812 visitors, including many superintendents and other officers of roads, had been entered up to this time. The rooms had so far been self-supporting, mainly from moneys received for advertisements inserted in the register. He thought this convention should take some formal action in the matter, and that the recognition of these rooms should appear on our records.

MR. F. D. ADAMS, Boston and Albany, moved the adoption of the following resolution:

Resolved, That this association assume control of the rooms of the car-builders in the city of New-York, and that their management be placed in the hands of a committee consisting of the officers of this association, with power to call meetings for consultation and discussion not oftener than once a month.

On motion, Messrs. M. N. Forney and C. A. Smith were added to the committee named in the resolution.

The resolution was then adopted.

A WRONG IMPRESSION CORRECTED.

MR. L. GAREY offered the following preamble and resolution, which were agreed to:

Whereas, It is thought that an impression prevails among the managers of some railroads, that the action of this association is intended to be enforced by its members without the advice and consent of their superior officers, therefore

Resolved, That it is the sense of this meeting, that the resolutions of the master car-builders, in convention assembled, are intended merely as recommendations, made as an association, to the managers of railroads for their adoption or rejection, as they may deem expedient.

ACCIDENTS FROM CAR-COUPLING.

MR. M. N. FORNEY called the attention of the convention to the great number of accidents and loss of life occurring from the present methods of coupling cars. He had for some time past kept a record of all the accidents of this class which had come to his knowledge, and they were so very numerous that he thought this convention should take some action in the matter with the view of remedying the evil so far as it could be done. He would therefore move that a committee be appointed to report at the next meeting on this subject.

CAR-AXLES, OIL-BOXES, AND JOURNAL-BEARINGS.

The Chair announced that the hour had arrived for resuming the consideration of the subject of axles and journals, the question being on the motion of Mr. Adams, made yesterday, to substitute a journal 4 inches in diameter, instead of $3\frac{1}{2}$x7, as recommended by the committee. This motion was made as an amendment to the motion of Mr. Johnson, that the report of the committee be adopted. Pending the consideration of the amendment, yesterday, the committee were instructed to confer with the committee of the Master Mechanics' Association, and report this morning, whereupon

MR. F. D. ADAMS, the chairman of the committee, reported that they had, agreeably to their instructions, conferred with the committee of the Master Mechanics' Association, and that the joint committees had concluded that, if obliged to recommend a size of journal for car-axles, they would at present not feel authorized to propose one larger than $3\frac{3}{4}$ inches in diameter and 7 inches long; but that, in consideration of the great importance of the subject, the diversity of opinion and to some extent the limited knowledge existing in regard to it, the committee recommend that the subject be referred back, with instructions to confer with the committee of the Master Mechanics' Association, and report specific sizes for a standard axle, with a detailed drawing showing clearly its form and proportions, to the next annual meeting. The committee, however, recommended that the subject be fully discussed at this time.

MR. I. W. VAN HOUTEN moved that the report be adopted.

MR. L. GAREY.—I really hope that this matter will not be passed over for another year. It has been discussed now for two years. We have probably added one hundred thousand cars to our rolling-stock during that time; and if you go on during another year and add another hundred thousand to it, I think possibly we may be a little better prepared to adopt something a year hence. But it does appear to me that, after having the subject before us in the manner in which we have had it for the past year, we should be prepared to do something. This procrastination, I think, is wrong. I believe in making haste slowly, but I do want to see this matter considered now, and I hope it may be settled.

MR. R. B. MORE, Indianapolis and St. Louis.—I hope this matter will not be passed over. I think we are fully prepared to adopt some definite course. The matter has been under discussion now for two years, and the sooner it is disposed of the better. I do sincerely hope that we may come to a final decision; and if we only accomplish that at this meeting, I think we will have done a very good work—one that will pay for all the expense and trouble we have incurred. I also hope we will adopt not less than a 4-inch journal and a 5-inch wheel-seat—which is small enough. There was considerable discussion yesterday, and a great many men who have had a long and successful experience with small journals, gave their opinions. Now, it is very important that we have an axle that will not break. If a $4\frac{1}{2}$-inch axle breaks occasionally inside the wheel, as we have known them to do, and if half an inch additional in diameter will prevent them from breaking, then it is certainly a very simple matter to be arranged. By adopting this course, we shall certainly add so much to the strength of the axle. The increased size of the journal would also tend to reduce the large amount of hot boxes that we have now. Another thing to be taken into consideration is, that there is a disposition to increase the burdens carried on our roads. Frequently from 18 to 20 tons are placed on a car. And then we must have some little look ahead, and some regard to the exigencies of the future; for we know that the roads will carry heavier loads than they do now—the legitimate load being ten tons. We are adopting an axle now, not only for the time being, but one that we hope will stand for some years in the future, at least. Let us get it, if any thing, a little too strong. It will be a great deal better to be that way than too weak. The additional expense, caused by the increased size of the axle, will be but small; and, as I understand it, the additional expense of putting it on the road will not be any thing. We only propose, as I understand it, to put up our new work in this way, so that there will really be no expense to any body, by reason of the adoption of this recommendation. All we propose to recommend is the adoption of this standard size, and I really hope that we will now come right down to the business before us, and adopt some definite proposition.

THE CHAIR ruled Mr. Van Houten's motion out of order. The question is now open for discussion on the amendment offered by Mr. Adams. The motion is to increase the size of the journal from $3\frac{1}{2}$ inches to 4 inches.

MR. E. VARNEY, Fitchburg R.R.—I, for one, hope that we shall not recommend increasing the size of the journal to 4 inches. There has been a good deal said in regard to the dead weight of cars, and the desire seems to be to get lighter stock on our roads. Now, if we increase the journals to 4 inches by 7, we have got to have all the other parts of the axle increased in proportion, which is going to add a good deal to the weight of it, and I think it would be very unnecessary. It is true that we have run axles that we consider too small. We have a good many 3-inch journals on our road now, that are doing their work efficiently, and they carry ten or fifteen tons. They break occasionally, but not very often. I have not had one break for the past five years. We have got a larger size, which we have adopted, which is $3\frac{1}{4}$ inches in diameter. I never have had one of those break. My wheel-seat is $4\frac{1}{2}$. I have never had one of that size break inside the wheel. I have had $21\frac{1}{2}$ tons of freight come down on journals and axles of that size. It brought this great weight safely. Now, I think that to increase the diameter to 4 inches is carrying the matter too far. I don't think our officers will sustain us in so doing. If we have got to have every thing else in proportion, it is going to make a great deal of dead weight. We have got to have a heavy oil-box and a heavy jaw to receive it. Every thing has got to be increased in size. I should not go above $3\frac{1}{2}$x$6\frac{1}{2}$ inches. That would be large enough for any thing. We build cars for ten tons; if the officers allow twenty tons to be put on these cars, it is their fault, and the axles ought to break once in a while so as to prevent overloading in this way.

MR. H. LONGEST, Rich., Danville, and Piedmont.—I would state, for the information of the association, that I have cars on my road which have journals 6 inches long and $3\frac{1}{2}$ inches in diameter. They will carry forty tons, and none of them have given way for the last six months. I would like to see a journal 7 inches long—I am in favor of that. In regard to the diameter of the journal, I would not go beyond $3\frac{3}{4}$ inches. That would be amply sufficient for all the cars that we build. As to the length of the axles, of course, you can fix it that way. They have different gauges on our roads.

MR. T. B. STEWART, Hartford and Wethersfield Street R.R.—There is one thing of importance for us

to consider when we are making the change, and that is, whether the increase proposed will be sufficiently large, so that, if we wish, or if it should be positively necessary to return to 3¾ inches, it can be done If it is made 3¾ inches, you can go beyond that, and afterward make it 4 inches. Our axles are growing larger and some of them will actually be 3¾ inches in diameter, and the journal and wheel seat accordingly. When I have occasion to make any thing of that kind, I wish to be sure and be on the safe side, so that it will not be necessary to alter every thing over again. We can come back to 3¾ inches, if we determine it in the way I have suggested. Therefore, it looks very clear to me that it will be advisable to adopt that course upon the showing of such tests as we have had. Now, there are various ways of testing this matter, which can be readily applied, as suggested, to different kinds and amounts of metal that we find rusted and worn out. That proves very conclusively something definite in regard to this question, and no one can bring any proof to countervail it. It looks very clear that any thing which has stood such tests as this, must be possessed of actual merit.

MR. R. HITCHCOCK, Conn. River R.R.—From Mr. Garey's statement yesterday, of experiments made by him, I infer that the conditions of these various experiments were equal. I would like to ask if that was not the case—that is, the weight of the car, the number of wheels in use, etc. etc. My purpose is, that this convention may know whether we are making provision for a car-wheel that is to support a car weighing thirty tons, or one that is to support twenty tons. I don't believe that a few years hence we shall build a car that will weigh thirty tons, for common use. It is commonly the case that one extreme follows another, and I would warn this convention against these extremes. It seems to me that the increase of the length of journals would be a benefit, but to go beyond 3¾ inches I should certainly object to, for I think it entirely unnecessary: 3¾ inches would be my choice. I have never noticed in my experience the breaking of journals unless the box had been neglected—hot boxes often literally burnt them off. We have frequently had them burnt off from the inside shoulder, but never from the outside. I hope gentlemen will consider the matter well before they fix the size, as some have suggested here. The remarks that have been made are very proper, but I do not see the necessity for so large a journal. I have run axles 80,000 miles, and then found that they supported a weight of 30 tons, the journal being 5½ inches, and the weight of the car 19 tons.

MR. WILLIAM JOHNSON.—Are you not mistaken in regard to the car being a freight-car, which you said weighed nineteen tons?

MR. R. HITCHCOCK.—It was a passenger-car.

MR. L. GAREY.—I will endeavor to answer Mr. Johnson's question. It was a baggage-car belonging to a passenger-train; it weighed about nineteen tons. Each bearing had the same service to perform, having the same attention, the same lubricator, and every thing as nearly equal as it was possible to have it. That was the intention.

MR. R. HITCHCOCK.—I wanted to know more particularly what the weight of this car was—whether a journal of the largest size was of as much benefit to a car weighing nineteen tons, as it might be, perhaps, to one of thirty tons—not understanding what the weight of the car was.

MR. L. GAREY.—I would like to correct my statement in reference to this journal. It was taken from a baggage-car, weighing fourteen tons, with the usual amount of baggage, and frequently running up to 22 and 23 tons. We had only passenger-coaches on, with the exception of the baggage-car from which this was taken.

MR. F. D. ADAMS.—In all the remarks that have been made thus far in relation to the axles, on the part of those who are opposed to an increase in the size of the journal, it seems to me that the speakers have lost sight of the main object, as I understand it. In other words, they are trying to show, entirely and altogether, that what they have got is doing pretty well. We do not deny that at all, in the main. But we, who are in favor of a larger axle, claim that we ought to do a great deal better; and we come here with practical facts that are proved beyond possible contradiction, and demonstrate that we can do better with larger journals. Now, it seems to me that, unless a person were governed very largely by prejudice, he must admit those facts, if he were inclined to admit the truth at any time. Now, there are none of us that would wish to charge Mr. Garey with any attempt at evasion in this matter. He has put different kinds of axles under a car, and then run them under the same circumstances exactly. He has demonstrated, beyond all dispute, that a journal which has a diameter of 3¾ inches and is 7 inches long, consumes half the amount of brass that one, running under the same circumstances and weight, that measures 5¼ by 3¼ inches, consumes. Now, just figure that up, and consider it by itself. You can see, and any body who will run it over in his mind can see, what a saving that single item would make to a railroad company in a year. A company that owned 4000 cars—and many of our railroad companies have 20,000—would have 32,000 brass bearings, and by the saving of half the metal, a very nice sum of money would be saved to the company. They say you are going to add wonderfully to the expense of railroads. They say, "What are we going to do with our old cars?" I do not propose to add to the expense at all, except on the first item of the weight of the axles themselves. It is true that we should add a little to the expense there. But if it be a slight increase of expense, we insure, too, a greater degree of safety for our trains. It would be a great safeguard against the large expenditures that are occasioned on railroads in consequence of broken axles. It is no uncommon thing for a railroad company to pay fifteen or twenty thousand dollars in consequence of the breaking of an axle. That would go a great way toward strengthening up the wheel-seats, to say nothing of the saving we can make in the brasses. My own opinion is, that very many of our members are laboring under a great mistake in reference to this matter.

MR. VAN HOUTEN.—Can you name any particular accident that has occurred during the last year from the breaking of axles?

MR. F. D. ADAMS.—It would take considerable time to run over the many I can name. I have one in my mind now, which occurred on our road last year. It was an accident to a Michigan Central car, which caused an expense of $20,000 to the company, and lost the lives of two men. I could state a very large number of such cases. But to go back to what I was saying—I think there is, in the minds of many of our members, a prevailing opinion—evidence to the contrary notwithstanding—that just as quick as we increase the bearing surfaces we increase our *friction*. That idea is certainly untenable, as any one will see who will examine the scientific record on the subject. There is no scientific writer in existence that I know of—and I have studied this thing up for the last year, and can produce, if necessary, some of the best authorities on the matter—that pretends to claim that surface has any thing to do with friction. They say that it is weight entirely and exclusively that produces friction. If that is a fact positively established, and one which is recognized by all the scientific world, and by all the scientific men employed by our government, it strikes me that we master car-builders had better admit it to be a fact, and govern ourselves accordingly. I don't know but what we can make head against it, but I don't believe we can. I don't think that the determination on the part of some of our friends to bluff us off, or shake our determination, or bring up something to confuse us, is going to drive us from the point. I think that the members who are advocates of a larger axle—both the committee and all others—believe that it would reduce the expenses of our railroads in a few years. We don't claim that it is going to reduce it at first. I am willing, at any rate, to reduce the diameter of the journal down to 3¾ inches. If that will meet the views of other members, I will cheerfully consent to it. I would be perfectly willing to withdraw the motion I have made, and put the matter in that form, if I thought that proposition would be accepted. I am perfectly willing to accept a 3¾-inch journal, reducing the wheel-seat in the same proportion.

MR. E. VARNEY.—I think the gentleman who last spoke seems to desire to give the impression that there are a good many members present who oppose an increase in the size of the axle. I do not see one who is opposed to an increase. The thing that is opposed is this enormous increase. I said before that I should not be willing to accept any thing larger than 3¾ inches. That was saying that I would accept that for the sake of a compromise.

MR. F. D. ADAMS.—I am glad to hear Mr. Varney say that. I have heard no gentleman say that he was not in favor of an increase.

MR. F. CHILDS, Great Western of Canada.—Without expressing any opinion upon this question, I would like to give you a little of my experience. In the first place, I want you to understand that upon our road we do a very heavy square-timber business. We never could get cars enough to carry this timber. They are all flat cars. The question arose as to whether it would not be better to build cars that would carry more than ten tons. Mr. Sharp, who was superintendent at that time, took it into his head to build some cars that would carry 50 tons, and we carry 50 tons on them. Each car has eight axles, or sixteen wheels. The journals are 7 by 3¾ inches. I never knew one of them to break. I don't know that I ever knew one of them to run hot. I wish you all to understand that I am decidedly in favor of the enlargement of the journals; but it would be a question in my mind whether it would be necessary to take it up to 4 inches. Of course, if other gentlemen think it would be necessary to do so, I would not vote against it.

MR. H. O. WADLIE, Illinois Central.—I wish to say that we are running 3¾ x 6 journals, and probably meet with as good success in running that size as any road in the country. We lose very few axles. Mr. Van Houten yesterday asked a question which has not been answered, and which is of considerable importance in my mind, with reference to ascertaining the proper size of the journal. He pointed to this model of an axle here, and asked how many axles we had seen broken off just at the inside shoulder of the journal bearing.

MR. W. E. CHAMBERLAIN.—I have seen twenty-five broken off inside of the inside shoulder of the journal, within the last twelve months.

MR. A. STEINBACH.—Four years ago, before we increased the diameter of our journals from 3¼ inches on our road, we had seventeen journals broken off at that very point. That induced us to increase the size. Our journals are 3⅞ x 8.

MR. WADLIE.—How many of those axles broken off at that point, had hot bearings?

MR. STEINBACH.—There was not one.

MR. CHAMBERLAIN.—I will not say positively that there were no hot axles. Three trains in one day broke down in front of our shop, and waited there for the journals to cool. They were trains of stock-cars, going into Brighton. The journals were 3¼ x 5½.

MR. WADLIE.—Can you tell us how long those axles had run, and whether or not they had at previous times been hot?

MR. CHAMBERLAIN.—I should think not, from the appearance of the journals. I could not state as to the length of time that the axles had been run. On some of them there was not much wear.

MR. BRAY.—Were not the journals very much crystallized?

MR. CHAMBERLAIN.—I don't know much about crystallization, and therefore can not inform you. The Boston and Albany road does not put any thing on that goes down to 3 inches, or allow any thing to stay on the road that is below 3 inches.

MR. WADLIE.—I am highly gratified with these answers. They are very much different from my own experience. I have received messages many times from trains on which it was reported that journals were broken. But in the course of twenty years I have seen but one journal that had a good fair break in it at that point. Gentlemen talk about broken journals where there have been hot boxes worn half way off, brasses worn out, or a place worn by the bearings on the inside end of the oil box. There are all sorts of wearings where they call it a broken journal. But I have met with but one case that I could say was a good fair break. That was under a Cleveland, Buffalo, and Erie car. My friend Adams had charge of the road at the time, and I put in a pair of wheels. I accounted for the break in this way: we had a gauge that was different from that of a connecting road. The car upon which this journal was broken off had been received from that road, and was of a wider gauge than that journal could possibly run on and keep it inside of the rail. The wheel dropped out after running some four miles on our road. My idea would be that a 3¾-inch diameter is large enough. In regard to the length, I should favor an increase of that, rather than the making it less than six inches.

MR. M. P. FORD, Pitts., Cin. and St. Louis.—I am in favor of a journal 3½ inches by 7. One reason why I am opposed to a larger one is, that I believe by increasing the size of the journals, we increase the amount of friction. I believe that what we want is, first, to get a size sufficiently large to insure safety, and then to distribute the weight over a larger surface. We should put the increase on the length of the journal, rather than on the diameter. It must be evident to us all that an axle revolving with a 4-inch journal must travel some ways further on its surface than one revolving with a 3½-inch journal; consequently, there is more space traveled over on the bearing; and it seems to me that we lose power, increase the friction, and save nothing in the matter of safety.

MR. W. E. CHAMBERLAIN.—I want larger axles, for three reasons: First, we are troubled with axles breaking at three points—the inside collar of the axle, and at the wheel-pit, both inside and outside. Seven years ago, I was connected with the Atlantic and Great Western Railroad, at a place in Ohio. At that time, our passenger-cars were equipped with 3½ x 7-inch journals, to conform with the cars of the Erie road. The calculation was to run our cars from Cincinnati to New-York, and theirs from New-York to Cincinnati. Of these journals, we averaged about seven in a year broken off at the inside shoulder. At that time, we went to work and narrowed up our trucks, and put in a journal measuring 3½ x 6. We had no trouble from the breaking of journals of that size while I was on the road, though we had lots of hot boxes. I should recommend a little different style of

axle on the back part of the wheel-seat from that represented in this large model before me. Every time a pair of wheels is worn out, it is necessary to turn a little off from the wheel-pit. As we have axles already in use that break on the inside shoulder, we should naturally turn off and leave a little bit of a curve, even with one fitting; consequently, we are weakening our axle to that extent.

MR. M. N. FORNEY.—I am satisfied, from my investigations, that friction will not be increased by increasing the surface of the axle. The amount of friction is dependent upon the condition of lubrication. A large axle can be lubricated more perfectly than a small one. The reason why axles break is because they are not strong enough. Therefore I am in favor of making them as strong as possible. I should recommend 4 inches by 8. In my opinion, it is more desirable to increase the length than to increase the diameter, and the friction will be less with an increased length than with an increased diameter. But on an axle you have a load to carry, and must furnish the requisite strength. There is a limit beyond which you can not increase the length. You must, therefore, increase the diameter. I don't know whether you have observed the difference there is in the power of a shaft to turn, between one well lubricated and one imperfectly lubricated. One is ten times greater than the other. The greater the weight is, the more liable is the lubricant to be forced out. With a large surface there is comparatively little danger of the lubricant being forced out, and the whole journal is more perfectly lubricated than if the weight were concentrated on a smaller surface. I don't think you will get strength enough for our heaviest cars without making the journals 4 inches by 8. It is true that my investigations have been more of a theoretical than of a practical nature; but there can be no question in the mind of any one who will investigate the subject, that friction is not increased by increasing the surface. That has been decided over and over again by experiments made a hundred years ago, and very often in more recent times. The result has been uniformly the same. The friction is directly proportioned to the weight upon the journal.

MR. J. T. LEIGHTON, New-Haven Car Co.—I don't know much about the wearing out of cars, except what I gather from such a discussion as this. However, I can readily see that the journals should be enlarged. I think it is important, also, that the wheel-pits should be enlarged. As I understand it, there are more breakages on the inside of the wheel-pit than on the outside; consequently, you should have more iron on the inside. In order to get that, you have got to incur some additional expense. But after you have once incurred that expense, it seems to be useless to throw your iron away on the other end. I think it has been demonstrated here that the friction is not increased by an increase of surface. From all the information I can gather, I am led to favor the enlargement of the journal to $3\frac{3}{4}$ inches by 7 inches.

MR. A. C. ROBSON, Lake Shore and Mich. So.—The standard axle of the Lake Shore road, at the present time, is $3\frac{1}{4}$ x $6\frac{3}{4}$. We do not allow those axles to run over one year. I have never yet known one of them to break. I have at Buffalo, at the present time, about 300 of them that have been taken out, having done their service. I think if that size of axle was adopted, and they were not allowed to run after the iron began to crystallize, we would have no difficulty with broken axles.

MR. L. H. CUMMINGS, Cummings Car-Works.—I believe that most of the narrow-gauge roads are using, at present, $3\frac{1}{2}$ x 6 journals on a majority of their cars. If you increase the length of the journal to 7 inches, I think the diameter should be increased to $3\frac{3}{4}$ inches.

MR. J. W. PHILBRICK, Maine Central.—I have trusted my cars for a long time, as have a great many of us, upon $3\frac{1}{4}$ x $5\frac{1}{2}$ journals, with a very small percentage of breakage and a small share of hot boxes. I propose to prevent hot boxes, by adding $1\frac{1}{2}$ inches to the length of the journal, and to give extra strength, in proportion to that leverage, by adding sixteen per cent to the quantity of iron. This would probably increase the strength twenty per cent or more.

MR. J. P. SOMERBY, Eastern R.R., moved that the roll be called, and that each member state the dimensions of journal he preferred. The motion was carried, the roll was called, and each member announced his preference, the result being as follows:

In favor of a $3\frac{1}{2}$ x 7 journal—Messrs. Ruel Dean, I. W. Van Houten, David H. Baker, Hugh Gray, G. W. Demarest, Christopher Woods, A. Langley, James McGee, Robert Hitchcock, George Dunham, M. P. Ford, A. Gleason, J. T. Nalls, Samuel Campbell, W. R. Davenport, A. C. Robson, F. O. Bray, Jacob Hay, Albert H. Dennett, William J Worth, J. D. McIlwain, J. J. Traver, J. W. Philbrick, D. H. Stratton, and A. J. Allen—25.

In favor of $3\frac{3}{4}$ x 7—Messrs. Joseph Jones, V. D. Perry, George R. Bentley, F. D. Adams, D. S. Dockstader, George Hackett, M. C. Andrews, H. Longest, George E. Stevens, Leander Garey, Milton Wilder, L. H. Cummings, J. Marsh, J. B. Weston, J. P. Somerby, D. C. Richardson, B. F. Mitchell, James T. Leighton—18.

In favor of 4 x 7—Messrs. C. A. Smith, W. E. Chamberlain, Samuel Griffith, R. B. More, W. H. H. Price, and Thomas G. Davis, and C. E. Garey—7.

In favor of $3\frac{1}{2}$ x $6\frac{1}{2}$.—Messrs. Enos Varney, W. A. Morgan, and S. A. Davis—3.

In favor of 4 x 8, M. N. Forney; 4 x $6\frac{1}{2}$, C. J. Holbach; $3\frac{7}{8}$ x 8, Aaron Steinbach; $3\frac{3}{4}$ x 6, John Lightner; $3\frac{1}{4}$ x 7, H. O. Wadlie; $3\frac{1}{2}$ x 6, J. N. King.

MR. C. A. SMITH, Erie Railway.—I shall have to relate a little of the experience we have had on the Erie road with the $3\frac{1}{2}$ x 7 journal. We adopted a journal of this size in 1862, and ran it till 1867, when we abandoned it for one of $3\frac{1}{4}$ x 6, the running of which was more satisfactory than the former. In almost all cases where the old journal had run for any length of time, there would be a break. We never could run it any cooler than we have run the $3\frac{1}{4}$ x 6. We had most of our passenger and baggage-cars with $3\frac{1}{2}$ x 7 journals. We abandoned them at that time and took them all out. Many of my friends know that I am an advocate for the largest size of oil-boxes. I say, enlarge your journals and you will have no hot boxes. The increase of dead weight that you have in consequence of that enlargement is of no sort of consequence, and is not to be thought of for a moment. If you are going to jump a ditch, jump clear across and don't strike your heel into the mud. When we have a journal measuring 4 x 7, we have obtained a size sufficiently large so that you can go back a little if you desire to do so. Here is a bearing that I put under a thirty-ton Pullman sleeper which ran 27,768 miles. We have a broad gauge, which many think is more severe on journals than a narrow gauge. We hope we shall have an opportunity of trying the narrow gauge soon, to see what we can do with it. The boxes were not warm in the least. They ran perfectly cool, as nearly as we could get at it. At Jersey City, where the car was taken care of, we did not use two thirds of the oil that we did upon an ordinary box. There is nothing but soft lead, and less than one sixth of an inch worn out in running 28,000. It would be running yet but for an accident, occasioned by hot boxes upon another car, by which we lost three Pullman sleepers, two day-coaches, and a baggage-car. If you enlarge your boxes you will save your companies thousands of dollars in avoiding hot boxes, which cause all manner of damages, not only to the car itself, but to the trains following. We might as well get them large enough and have them all right. Some have a reluctance in going to our officers and saying to them that we have been all wrong for fifteen or twenty years. I say we should tell them that we have been wrong. It does not reflect upon our mechanical ability at all. They will think so much the better of us for it. I have been with you in small journals, and I have seen the evil of them. Now, we want to have them large enough, so that there will be no trouble. What I want to hear from some of the other members is, the objections they have to the large journals. The weight is of no consequence. It is not worth mentioning. That box only weighs four pounds more than the box we use for our other journals. We use the same pedestal as on our other cars. We are selling on our road not less than fifty cars a month of those having the old axle worn out. See what an advantage we shall secure for the traveling public, if we make this change. Every thing will go more safely. There will be no more broken axles, or hot boxes either. I wish that some of the members who are advocates of small journals and boxes would tell us their objections to this plan. If we can have them, I will go in for 4 x 7 journals all the time.

MR. L. GAREY.—In 1845, our road was troubled very much with broken axles. We were then using a 4-inch, $4\frac{1}{4}$-inch, and $4\frac{1}{2}$-inch axle. I was very much exercised about the matter, as we had had several accidents where people had been killed, and I made an examination of the axles, so I could apply the remedy. I went to the place where they were deposited that we had set aside, placed some of them in the fire, and brought them to a cherry heat, and then took the scales off in order to see if the axles were perfect. I found that nine tenths of them were cracked at the shoulder inside. I think several of them I have broken off by simply dropping them from the anvil, or so nearly broken off that they were useless. That was conclusive evidence to my mind that the fitting up of our axles was all wrong. If they universally broke off at the shoulder inside of the hub, why not dispense with the shoulder there altogether? From that day to this, I have used an average size at the wheel-pit of 5 inches. I have turned them off, leaving no shoulder at the inner edge of the wheel-pit. When the fitting was made, there would be about $4\frac{3}{4}$ inches—possibly $\frac{1}{16}$ more. I can safely say that we have never had one of those axles break. We have worn the journals out in many instances, but we have not had the first instance of a broken axle upon our road since that time. I had to conform to the old size of journal—$3\frac{1}{4}$ x $5\frac{1}{2}$, and was forced to turn down the outside of the wheel-pit and allow a small aperture in the oil-box, weakening the axle, which has troubled me very much, though I have had no breakages of axles; but I have had a great many hot boxes. I am satisfied with the form of axle leaving no shoulder upon the inside. If those are used, properly fitted up, we will hear of no broken axles on railroads—that is, if you get good hammered iron. In regard to the size of the journal, I was in favor of 4 x 7; but I will not object to $3\frac{3}{4}$ x 7. Inasmuch as it has been shown that $3\frac{1}{2}$ x 7 will break, has caused damage to property, and loss of life, can we, as men of sense, adopt or recommend any thing of that kind? For one, I can not do it, in view of the facts and considerations that have been presented here. And I hope this convention will take into consideration the fact that the public is interested in this matter. If, knowing these facts that have been laid before us, we proceed to put upon our roads sizes of axles that we know have caused accidents, we shall be guilty of murder if people are killed, and I, for one, dare not do it. In regard to the matter of dead weight—that is in the foundation of your structure; it is not worth speaking about. I remember when I was connected with the Lake Shore Road, we had a terrible succession of accidents from the breaking of locomotive driving-axles. From investigations we found that the breakages occurred in engines of eight years' use. New axles were supplied, and an order passed forbidding the employment of engines of more than seven years' use. We found that our driving-wheels were going off into people's lots and damaging property. We are not all cast in one mould. Each man has his individual ideas, and desires to express and maintain them. The fact that you have risen to these positions, shows that you have minds of your own and judgments matured. Of course, a man does not exactly like to give up his pet idea. But we can not all have our own ideas carried out. We must compromise. If we should settle down upon $3\frac{1}{2}$ x 7, go a quarter of an inch better than what Mr. Van Houten has demonstrated to be not only safe but very economical in running, I think that in years to come we shall never have occasion to blush for our vote as we record it to-day. [Applause.]

MR. C. E. GAREY, New-York and Harlem.—Being in Mr. Garey's employ, and instructed by him to put these journals upon a car to test them, I have taken a great deal of interest in this matter, and have watched it very narrowly, and I am very well satisfied in my own mind in regard to it. The bearings answer for themselves, and show that it has been a fair trial, and that a $3\frac{3}{4}$ x 7 inch journal has been worn off only just barely enough to measure about one hundredth part of an inch in running a fraction over 28,000 miles. On the other hand, a good deal has been said in regard to dead weight. Now, it appears to me that if the axle be large enough, it can be made hollow, and hammered at the same time, giving us a lighter axle than we have at present, and consequently a larger and much stronger one. I think there is no gentleman here who is not ready to admit that if a hollow axle could be produced, well hammered, having a hole through it, for instance, $\frac{3}{4}$ of an inch in diameter, the axle would be much stronger than at present, and consequently I think this dead weight can be reduced very materially and still increase the size and strength of the axle. I go for a 4 x 7-inch journal, and a 7-foot axle.

MR. J. P. SOMERBY.—My mind was made up to $3\frac{1}{2}$ x 7, but I have altered it since this discussion began. I think if we make a mistake, we had better make it on the side of strength. My vote is for $3\frac{3}{4}$ x 7.

MR. I. W. VAN HOUTEN.—I want to say that for several years there has been a general order on the Pennsylvania Railroad, that whenever an axle is taken off and goes into the hands of the workmen, it is to be put into the fire and heated, when the least crack or defect will be discovered in the heated part. Now, although these axles may have run for one or two years, I have never yet discovered by my own examination a crack in the journal, nor have I ever had my attention called to the fact of an axle being cracked at that point; but almost universally, if we discover a crack, it is at the shoulders. I simply wanted to mention that fact to show that we either have extraordinary good iron, or my brother Chamberlain has extraordinary bad iron. We only allow our axles to run twelve months in actual service under passenger-car stock; we then transfer them to freight. I have seen tests made where the drop-hammer has broken the axle into two pieces.

MR. F. D. ADAMS.—I suppose we are all anxious to close this discussion, but the more we can learn about this matter the better will our object be accomplished. There has been considerable said, and a number of ideas advanced, in relation to the matter of friction, and quite a large number have expressed fears of the consequences if we enlarge the diameter of our jour-

nals. They evidently entertain the idea—any authority to the contrary notwithstanding—that increase of friction necessarily accompanies increase of diameter of journal. Now, I should like to call attention to a few facts, that I suppose myself to be facts, and they are admitted to be so by higher authority than we are. I want to read a few quotations that I have taken from a work entitled "Dictionary of Machines, Mechanics, Engine Work, and Engineering:" edited by Oliver Byrne, and published by D. Appleton & Co., 1850. The author refers to an engineer who was employed by the French Academy of Science, and had the authority of the French government to perform certain experiments in order to ascertain if possible, the law of friction. These experiments were performed during the years 1830 to 1834—a continuous series, and no expense was spared in making them. In this book, on page 707, he says:

"The whole doctrine of friction may be reduced to the single proposition that the friction is proportionate to the pressure upon the surfaces in contact, and independent of the extent of these surfaces, and of the velocity of their motion.

"A series of experiments is mentioned by the French Academy of Science, conducted by M. Moran, by order of the French Government. In these experiments, the surfaces were made to range in extent from 1 to 84. The forces that pressed them together, from 88 to 2205 lbs., and the velocities, from the slowest perceptible motion to $9\frac{8}{10}$ feet per second, causing them to be at one time accelerated, at another uniform, and at another retarded; yet throughout all this wide range of variation, in no instance did the ratio of pressure to the friction differ more than a mere trifle. The deduction from this is, that rolling friction is entirely independent of the extent of surfaces in contact, and also of velocity.

"This same law of friction is recognized by W. H. C. Bartlett, Professor of Natural and Experimental Philosophy in the United States Military Academy at West-Point, in a work entitled 'Elements of Analytical Mechanics,' and published 1854. In this he quotes M. Moran, and refers to the experiments made by order of the French Government."

Any body can get these works and read them for themselves. I formerly entertained the same views with the great majority here, that just as soon as you increase the diameter, you necessarily increase the friction. I could not for the life of me see how it could possibly be otherwise; and I believed just as some individual does who has interested himself in this subject, and taken the pains to write to THE CAR-BUILDER, and say that it would be no more irrational to assert that a large journal weighs no more than a small one, than to assert that there would be no more friction on a large journal than on a small one. Now I do not assume to know more than M. Moran, and I do not believe it is wise for us to let our preconceived opinions have too much influence on our minds. If we have not been educated right, our conclusions would be naturally wrong; and if we give our attention to the opinions of men who have made this subject a study, and have had larger opportunities to obtain information than we have had, we shall be more likely to be right. Now I took it upon myself, having taken more interest in this matter, perhaps, than some others did, to protest against the report of the committee, because I had made up my mind, from what I had read, that the principle by which we were governed was wrong; that we labored under the conviction that the moment we increase the diameter, we increase the friction. That we wanted to avoid; and yet we know well enough that when we increase the length we ought to increase the diameter, to keep up the strength. We did not dare to do that, because we thought we should thereby increase the friction. Now, I say that there must be proportion for strength as well as for beauty; and in looking it over carefully, I came to the conclusion that 4 by 7, or $3\frac{3}{4}$ by 7, was not far from the proper size to adopt, and I think that conclusion is based upon good common sense, and good scientific authority. I mention this, not because I want to urge upon the convention the adoption of something that I have got into my head, and made a hobby of, but, as Mr. Garey has said, I should hate to have my name recorded here among the members of this association, and giving it as the opinion of this body, in view of all the accidents that occur in the country, resulting from various causes, and a good many of them from broken axles, that it would be unwise to make a larger axle, because, perhaps, our officers have not given that attention to the subject which they ought to have given it, and would not approve of the change. I think we ought to come to a conclusion from a careful examination of the matter, and from an examination of good authorities, with a view of producing something that will give the public who ride in our cars confidence in their safety; and I also believe that in the end it will prove more economical, although it may cost a greater outlay of money, and may, perhaps, cost more to haul, because there is more dead weight, although what we put into the axle does not add very materially to the weight, because it is very near the centre of motion, and it would not add very much to the percentage of cost in hauling it. In this connection, I will say that I think, as Mr. Philbrick has indicated, that there is a principle here which has not been considered, and that is the principle of leverage; but that, as has been clearly indicated by Mr. Garey, is overcome by the additional advantages of lubrication. The advantages of the better lubrication overcome the leverage that we increase when we get further from the centre. I think that the idea of lubrication is lost sight of, and is not understood by a great many of our master car-builders. They do not understand perfectly, in the first place, the philosophy of particles of oil. Oil is composed of little globules, scientific men tell us, and whenever a pressure is brought so severely upon it as to break up those globules, it de troys the lubricating qualities of the oil. Now, that is just what we are doing in our small axles. When we load our cars with more weight than they are designed to carry, we have done something which must be injurious to the journal. I think any one will say that if we are going to build a car to carry 40 or 50 tons, we should certainly increase the size of the axles, although, in occasional instances, we have our cars that are made for 10 tons loaded with 20, 25, or 28 tons. I have seen our cars on the Boston and Albany Road, that were intended only for 10 tons, loaded with 28 tons. They did not run very cool, I want you to understand. On the other hand, within the last two months, we have built twelve cars designed to carry 30 tons, but we did not put in any $3\frac{1}{4}$ by 5 inch journals, by any means. These cars were put into a stone quarry to load stone upon, and if there should happen to be a block of granite weighing 30 tons, the car would carry it; but we would rather it should not weigh more than 25 tons. We concluded to run these cars to Troy, and load them with steel rails. When they got there, the men saw the cars marked 30 tons, and they put 36 tons of rail on four of them and run them to Springfield. There was only one brass on those four cars, so far as I know—and I inquired particularly about it—that got hot; the rest all came cool. Now, if that does not demonstrate beyond all dispute that it was nothing but the increased size of the journal, and the additional facility for lubricating, that carried those cars through, I am mistaken. All of these things have their influence; the whole combination makes up the improvement that we want to insure.

A MEMBER.—What was the size of those journals?

MR. ADAMS.—$3\frac{3}{4}$ by $6\frac{1}{2}$: but we have made up our minds, looking the thing over, that another half inch in the length would be an advantage. There was one of the bearings, you remember, got hot. If we had had the other half-inch, I think even that one would have run cool.

MR. M. N. FORNEY.—I would like to call attention to the size of the journals of truck-axles in locomotives. As you all know, the journals are placed inside the wheels, and of course they must be made the full size of the axle, 4, or 5, or $5\frac{1}{2}$ inches; and yet I never have heard any great complaint about those axles. I have never heard any complaint that the friction was very much greater than in other axles; but that size of journal seems to work quite satisfactorily. I am quite aware that there is more difficulty in lubricating a journal located in that way than other journals, but the size does not seem to affect it very much.

FINAL VOTING ON SIZE OF AXLES AND JOURNALS.

The question was then taken on the motion of Mr. Adams to increase the diameter of the journal recommended by the committee, to 4 inches; and it was lost without a count.

The question then recurring on the previous motion of Mr. Johnson that the size of journal recommended by the committee in their report published in THE CAR-BUILDER and *Railroad Gazette* three months ago, namely, $3\frac{1}{2}$ by 7 inches, be adopted as the standard of this Association, the yeas and nays were demanded, and being taken, resulted, yeas 29, nays 38, as follows:

YEAS:—Messrs. Ruel Dean, I. W. Van Houten, David H. Baker, M. P. Ford, Hugh Gray, G. W. Demarest, Christopher Woods, A. Langley, James McGee, David Hoit, Robert Hitchcock, George Dunham, A. Gleason, John T. Nalls, Samuel Campbell, William A. Morgan, J. N. King, J. F. Elder, D. H. Stratton, S. A. Davis, J. J. Traver, C. H. Kennison, J. W. Philbrick, W. R. Davenport, A. C. Robson, Jacob Hay, A. H. Dennet, W. J. Worth, and J. D. McIlwain—29.

NAYS:—Messrs. V. D. Perry, George R. Bently, Leander Garey, F. D. Adams, A. Steinbach, H. O. Wadlie, Joseph Jones, Enos Varney, D. S. Dockstader, D. C. Richardson, Elias E. Pratt, George Hackett, J. P. Somerby, C. A. Smith, W. J. Calais, B. J. Mitchell, M. C. Andrews, H. Longest, C. E. Garey, W. E. Chamberlain, J. Lightner, George H. Pratt, F. Childs, T. B. Stewart, Thomas G. Davis, Samuel Griffith, B. N. Phelps, C. J. Holbach, James T. Leighton, Milton Wilder, L. H. Cummings, J. Marsh, R. B. Moore, W H. H. Price, J. B. Weston, John C. Moore, J. E. Wiggins, and F. O. Bray—38.

So the motion of Mr. Johnson was lost.

MR. M. C. ANDREWS moved that this Association adopt as a standard size of journal, $3\frac{3}{4}$ by 7 inches; which motion was agreed to without a count.

MR. E. VARNEY moved that the extreme length of axle, including the collar, be 6 feet 11 inches—with a $\frac{5}{8}$ button on each end. His object was to get rid of the quarter and eighth of an inch.

MR. F. D. ADAMS.—Mr. Varney, to obviate one difficulty, creates another, which is still worse. He wants even figures, of course, to go over the whole length of the axle. Now, there is not probably one man in a hundred who, when he speaks of the length of an axle, means over all. He always gives the length inside the collars, as being the more positive point to work from. It does not matter whether the axle is a quarter of an inch more or less outside the collar; but if you vary it an inch inside the collar, you make considerable difference. That is the important thing, and we have given these even figures with just the view that Mr. Varney takes. His amendment would bring a fractional part of an inch inside the collars, and that is what we want to get rid of.

MR. L. GAREY.—I think that the length should be 6 ft. 10 in. between the collars, for this reason, there are many people who will not conform to the $\frac{5}{8}$ collars. Some use a half-inch collar, some $\frac{3}{4}$, some $\frac{7}{8}$, and you have really no definite length for your axle. If you use a $\frac{7}{8}$-collar, you shorten the length of your axle; you throw your wheel-seat nearer your wheel. If you take inside of the collars, you have a definite point; for the collars vary. There would then be no difficulty, and all would understand that very distinctly. I would move as an amendment, that the length be 6 ft. 10 in. between the collars.

This amendment was carried.

MR. H. O. WADLIE moved to increase the diameter of the axle $\frac{1}{4}$ of an inch at the wheel-seat, the space between wheel-seat and journal, and at the collar. This was necessary to make it correspond with the journal; but no increase was to be made in the diameter of the centre of the axle.

The motion was put and carried.

On motion of Mr. Forney, the committee were instructed to procure a drawing of the axle, and have it lithographed and furnished to the members of this Association.

The convention then adjourned to 8 o'clock this evening.

EVENING SESSION.

The convention was called to order at 8 o'clock P.M.

THE NEXT PLACE OF MEETING.

The committee on the next place of meeting, made a report, recommending Cincinnati, Ohio, as such place. The report was agreed to.

OIL-BOXES.

MR. F. D. ADAMS.—If there is nothing before the meeting, I would call the attention of the members to the fact that the matter of oil-boxes remains in the hands of the association. I do not understand the committee as having any thing further to do with it, without instructions. The committee, although I do not understand that they have been discharged, have performed, so far, all the duties assigned to them—that is, to recommend a standard axle and journal. Every one knows perfectly well that, if we adopt a larger axle, we must have a new oil-box; and it is equally important to have that uniform, in its core at any rate, making the brass the same, as it is to have a uniform journal. The oil-box, in fact, is the part that needs renewal oftener than any other, unless the other parts are destroyed by accident. This I think is a matter that should be settled at once. It is just as important to decide that to-night, in some form or other, as it was to decide upon the size of the journal. I do not know as I have any special plan to advise. I have brought here a form of box, with a view of giving the members an opportunity to see whether that, in its parts, or in any of its parts, suited them. The general idea, so far as I know, was suggested by Mr. Hoit. My own preference is for holding the brass in the way shown in the model, because it will wear up very close. It also gives a centre-bearing. The front of the box is made in two forms, because there might be a preference in regard to that. My preference would be for the sliding cover, instead of the old-fashioned top screwed on. This should be adaptable to iron or wood trucks, with or without a jaw, by simply altering the lugs on the side.

Another thing I will suggest, that, when it is understood what the association wants, some foundry pattern-maker should be employed to make these patterns of wood, making them sufficiently large to provide

for the two shrinkages, and take off iron patterns, and finish up those iron patterns to the order of any railroad that desires them. No road should be expected to take them until they were ordered by that road. If the Boston and Albany Railroad desire to adopt that box and axle, it is, of course, optional with them to do so. I have no doubt, however, that they will be readily adopted. We all understand that if boxes are cast from patterns made at two different foundries, the boxes will not go together, so that it is necessary to have this thing done under some system, or else it will never accomplish what we aim at. Now, if we can get any party—perhaps our friend, Mr. Davenport, here—to make these patterns, cast the iron parts from them, and finish them up to the order of any company that asks for them, we shall be sure of having uniform parts. I should order a set of them immediately. Mr. Chamberlain would want a set, I think; Mr. Jones would want a set, and perhaps two or three, just as soon as he could get them, and they would all be duplicates. I make this suggestion without any motion, so that we can think of it, and settle it in some way to-night.

MR. M. N. FORNEY.—It seems to me it will be utterly impossible to determine upon a form of journal-bearing and axle-box to-night. It is an extremely complicated question, and should be examined with a great deal of care. I move that the whole subject be referred to the axle committee, with instructions to report at our next meeting.

MR. F. D. ADAMS.—If that motion should prevail, it would put the whole thing right exactly where the majority of the convention do not want it, as indicated by their action this morning. It was stated here that there is one road which is going to change 2000 axles. They are ready to adopt the standard, but they can not adopt it until they know what box they are to use, unless they get up a separate box, and then we should have to adapt ours to that, whether we liked it or not. I have confidence enough in a portion of our members—at any rate, I have confidence enough in some committee that I could pick out here, to intrust them with the making of a box, and run my risk. I would be satisfied with what they did. I should not want to do it with all the members, because I do not think all of them are equally skilled in the operation of boxes; but I think I could select a committee that would be satisfactory to all, to whom that matter might be committed without any restrictions, and let them go to work and get the best plan as soon as possible; and I would move, therefore, as an amendment, that the matter be referred to a committee, with power to produce a box according to their own judgment, that shall be considered the standard box.

MR. FORNEY.—I would like to make an amendment, that that committee consist of seven, instead of the ordinary number, three.

MR. ADAMS.—The only objection I have to that is, that the larger the committee the more difficulty they would have in deciding upon a model. Of course, the more you have, the more wisdom may be embodied, but it is more difficult to come to a decision. I should prefer five to seven.

MR. FORNEY.—I will accept the amendment of five.

The amendment proposed by Mr. Forney, increasing the number of the committee to five, was adopted, and the motion in that form passed.

EXHIBITIONS OF INVENTIONS, ETC.

MR. L. GAREY.—I move that a committee of three be appointed by the Chair to make exhibitions during the next session of the annual convention, of machinery, inventions, and materials used in the construction and maintenance of cars, and that one evening during the session of the convention be especially devoted to their examination; that the committee be instructed to rent a suitable room for the purpose of such exhibition, and publish an invitation to manufacturers and others to exhibit their wares; and that the committee be requested to make a report at the first session of the convention next year, on the ways and means of paying the expenses of such an exhibition.

The motion was adopted.

CAR-ROOFS.

The President called upon the Committee upon Car-Roofs for their report.

Mr. C. A. SMITH.—The report of the committee, which I did not see until yesterday, is very incomplete. There were but fifteen replies made to the inquiries sent out by that committee, some of them very unsatisfactory, so much so that it would be a difficult matter to make a report upon them. I propose that the report be recommitted to the committee.

MR. VARNEY.—I move that the committee have further time.

MR. L. GAREY.—I move as an amendment, that a new committee be appointed.

The amendment was carried, and the motion adopted.

MR. SMITH.—I move that the committee be composed of gentlemen residing near each other, so that they can consult together. If a committee of three were appointed, living far apart, they would never meet.

MR. ADAMS.—I want to say just one word in relation to this matter of committees. The subjects which come before us for consideration are of vital pecuniary interest to our employers. We have the idea, because we are two hundred miles apart, that we can not get together. Now, no persons have such facilities for getting together as railroad men. The committee on axles are over 500 miles apart, but we came together, and it seems to me very easy for people to come together if they are so disposed. If the chairman of the committee would urge it upon the other members, and they were willing to comply with his request, there would be no trouble about it. I presume that on the axle question there were twenty-five or thirty letters passed between the members of the committee, and we traveled a good ways to meet each other, and spent a good deal of time together. We think we did our work—we certainly endeavored to do it, and if other committees would work as we did, I think we should have some valuable reports.

BRAKES.

The report of the Committee on Brakes, consisting of Messrs. Ramsey, Jones, and Gray, was called for by the chair, when the same was presented by the chairman of the committee, Mr. Ramsey, and read by Mr. Forney.

[The report is very voluminous and interesting. Its length precludes its insertion here. It will be published with the official report of the proceedings.]

The discussion of the report being in order,

MR. L. GAREY said: I have watched with a great deal of interest, for the past year, the improvements made in train power-brakes. I am much pleased at many of the improvements; but my idea of a train-brake, such as is required to do our work, is that it should not be solely under the charge or control of the engineer, but be so arranged that it can be applied from any part of the train by the conductor or brakeman, or a passenger, if he should be sufficiently acquainted with the action of the brake to do so in case of accident. We frequently find trains with the rear car thrown from the track; the engineer is not notified by any appliance that we have at the present time, and continues using steam, and throwing other cars off before he is notified that there is any thing wrong with his train. An accident of this kind occurred not long since near the Grand Central Depot in New-York. A train of fourteen or fifteen cars, full of passengers, left the depot, and after it had run some four or five blocks, from some defect in a switch, the rear car left the track, and was thrown across the street. Our Superintendent happened to be on the car forward of that, saw the accident, applied the Creamer brake, and broke the train loose from the engine, which was the first notice the engineer had that there was any thing wrong with his train. These things occur frequently, and it is certainly necessary that we should have a brake that is not controlled solely by the engineer. If an engineer has a broken driving-axle, or a broken connecting-rod, that would pass up through the cab, and demolish a part of it, what power would he have to apply the Vacuum, the Westinghouse, or any other brake? I wish that this association would, as an association, request the inventors of brakes to look at this subject in that light, and try to provide us with a train power-brake that will accomplish all we wish. If one appliance will not do it, have two; if it is necessary to have three, have three. I wish the association would take some action upon the subject.

MR. E. VARNEY.—I believe the Westinghouse brake, as improved, does that thing now; but whether there can be something that will do it better is more than I can say. They have an appliance by which you can brake up the whole train in any car of the train. It was on the cars of the Eastern road, on that train that we were on the other day. There is a small tank in each car that is filled with air all the time, and it remains there unless the appliance is used by some one on the train. Are you not aware, Mr. Secretary, that there was an arrangement of that kind on that train?

MR. L. GAREY.—Yes, sir. I saw something of that kind.

MR. E. VARNEY.—There is a tank that is sufficient for a car, and the appliance can be brought into use by any man in the train who knows enough to do it.

MR. F. D. ADAMS.—Who does know enough to do it?

MR. E. VARNEY.—They carry brakemen, a conductor, and baggage-master, and they would know enough. We use the Westinghouse brake, but do not carry any less brakemen than we did when we used the old brakes. We carry a brakeman to every two passenger-cars, just as before. They would all know about an arrangement of that kind. The passengers might not all know, and there might be some who would know. There is a line extending through the cars, and they could take hold of it at any point, if any thing happened, and pull it, and put on the brakes.

MR. V. D. PERRY.—I had supposed that all railroad trains were supplied with an attachment such as Mr. Varney has described, and which is very easily handled and the alarm easily given in case any thing happens at the rear of the train, by either a passenger or brakeman, who understands any thing about it. Certainly, if a car is off the track, the alarm could be given and the brake applied to that portion of the train that remains on the track. We have never had any trouble on our line in giving the alarm to the engineer almost instantly, if any thing does happen to the train. I had supposed that similar provision was made by all railroad corporations. A cord attached to the alarm-bell in the cab ought to be sufficient to warn the engineer at any time; but perhaps something better can be devised.

MR. L. GAREY.—I would ask Mr. Adams if he can not refer to some instances where cars have been drawn a long distance, and a great deal of damage done, and lives lost, on trains provided with a bell-cord in the usual manner?

MR. F. D. ADAMS.—I have known instances where the engineer was not alarmed by the bell-cord. The design of the bell-cord running through the train is to alarm the engineer from the rear of the train. A passenger-train would be considered very unsafe without this bell-cord; but I have known some cases where the engineer was not alarmed. I have in mind one case in particular. When I was on the Buffalo division of the Lake Shore road, an engineer came into the depot with nothing but a baggage-car. The rest of the train, three coaches I think, was twenty miles out on the road. The train broke off, the grade was a little down, and he jogged right along, not realizing the difference. He did not have occasion to stop again until he got into town, and then he looked back and saw that he did not have any train. I do not call to mind any instance where any serious accident occurred from lack of the signal that would be given by the breaking of a train in two. Accidents occur sometimes when there is not time to alarm the engineer by the signal bell, or not time enough for the engineer to stop. And then these signals are sometimes misunderstood to a certain extent, and consequently the stop is not made. That terrible accident at Angola occurred from the rear car going off the track, and running some twelve or fifteen hundred feet before it went off the bridge. The alarm was given to the engineer. He received the alarm correctly, but they were passing a station at that time where they did not usually stop, and the engineer explained afterward that he supposed that the conductor had found some passenger who wanted to get off, and concluded to ring up and let him off; consequently he did nothing more than to give the ordinary whistle for brakes without any extreme hurry about it. When he received the second alarm, he had got his engine clear over the bridge, and then he feared to reverse his engine because he didn't know but that the train might be broken in two, and did not want to stop too quick for fear the hind end of the train would run into him; consequently he did not whistle for brakes, and the result was, the car had got such momentum that it went off the bridge. I do not know what appliance could have prevented such an accident as that. But our scientific and ingenious men have had their attention particularly attracted to this question of brakes, and they are investigating it, and doing all they can to improve even the present system. With all the improvements that we have now, which we appreciate and acknowledge, my own conviction is, that the leading brakes that are now used in this country are being improved as rapidly as possible, and that, without any particular request or action on our part, all the appliances which ingenuity can devise will be adopted. It would simply show our interest in the matter to take some action.

MR. E. VARNEY.—I think the improved Westinghouse brake would meet the case that Mr. Adams speaks of, perfectly. That will apply the brake to the whole train. If one car goes off the track, or if the train breaks apart at any point, it is applied to every car on the train automatically, whether the car goes off the track or the train breaks apart. I saw it applied, and by simply pulling the cord in one car, it stopped the engine, although they did not pull the train apart as they intended to.

MR. F. D. ADAMS.—I simply wished to explain the conditions on which that car went off the track, as showing that the Westinghouse appliance would not have prevented it. As I understand the Westinghouse brake, (I confess my ignorance in regard to the automatic part of it,) I suppose it is necessary to break the connection between the cars somewhat, or extend it, at least. Is not that so?

MR. VARNEY.—No, sir.

MR. ADAMS.—Then it would probably have prevented it.

MR. VARNEY.—I will state the operation of the

Westinghouse brake. There is an appliance down very near the rail, and the moment that strikes the rail, it springs the brake on, and stops the whole train.

MR. F. D. ADAMS.—In that case, I think the appliance would not have touched the rail. The ground was frozen very hard, and it happened to be upon a piece of track where the road-bed was very level. The car ran along upon the hard ground, making no perceptible strain upon the engine, and the engineer did not feel any shock. Those wires, I think, would not have touched the rail in dropping four inches. Unless there was something to strike the wires, the brake would not have been applied.

MR. VARNEY.—No, but you can put them down as near to the rail as you choose—within two or three inches, if you want to.

MR. W. E. CHAMBERLAIN.—At the present time, there are several power-brakes that are not quite perfect, and I would move that the subject of brakes be laid over until our next meeting, and the committee be instructed to report what, in their opinion, is the best power-brake in existence at that time.

MR. I. W. VAN HOUTEN.—This question seems to have been discussed by the committee in reference to the Vacuum or Westinghouse brake. It is a question in my mind whether we had better undertake to discuss a matter of that kind, for various reasons. Every man in the association, probably, would have a preference for one or the other, either for the Westinghouse, the vacuum brake, or some other power-brake; and we might get an expression of this association, with a small attendance or otherwise, which might be very prejudicial to the interests of the gentleman interested in a brake, that might not be thought so well of by certain members of this association who might be able to carry their point in favor of one brake or the other. I never saw the Vacuum brake tested until the other day. I am not an advocate for it. I am not a special advocate for the Westinghouse brake. My opinion is, that our superior officers will attend to that matter for themselves. I do not think it is our business to go into the question of power-brakes, for good and sufficient reasons, to my mind, which it is not necessary here to explain. I am perfectly satisfied to let the matter lie over; but I would be opposed to the appointing of a committee by this meeting, to take into consideration the matter of brakes.

MR. F. D. ADAMS.—I take the same view, in the main, that Mr. Van Houten does. If the committee is to be continued for any purpose. I would simply continue it for the purpose of enlisting them perhaps more particularly in the examination of brakes; not that they should report to us the best brake, but, if there were any improvements made, during the year, over the brakes that now exist, they should report them to us. Perhaps something of that kind might do.

MR. W. E. CHAMBERLAIN.—With the consent of the second, I will withdraw the motion.

MR. L. GAREY.—I would move that the committee on brakes be continued another year.

MR. J. T. LEIGHTON.—I think it is very important that this committee should be continued. I think they have worked hard, and they have certainly made an excellent report. I have no doubt there will be greater improvements made in the coming year than there have been in the past; and the members of this committee are perfectly conversant with the matter, know where the material is to be sought for, and found; and I think it is very important that they should be continued, and that the matter be properly explained to them why they are continued. The committee is not to go over the ground they have been over, but merely to collect such information as can be had, and report at our next meeting. No doubt the improvements that are desired will be made, and the parties making them will seek this convention to show them, so that by another year we shall have them brought before us, and brought before us through this committee.

THE CHAIR.—I believe that the association fully appreciate the work which has been done by this committee, and I believe that it is because they have done so well, that they want the committee continued, and hope to hear from them at our next meeting something further in reference to whatever there may be to report in the way of improvements.

MR. L. GAREY.—The object I had in asking that this committee be continued was this: I know that they are now prepared to work much better than they have ever been. Two years ago, in Richmond, they declined to report, because there were so many improvements at that time being made, that they did not feel warranted in making a report. A year ago they were in the same condition that they were the year before. This year, they have made us a report which is valuable and, I think, appreciated. I know that they are now prepared to go on and work, and in order that we may have the benefit of their experience, I have made this motion that they be continued. If we appoint a new committee, they will want a year or two to advance themselves as far as the present committee is. I hope they will serve, and I do not doubt, if they do, that we shall get a good report a year from this time.

MR. F. CHILDS.—I think it is very important that we should take some action on this subject to-night. We have been discussing this matter now, to my knowledge, three years, and we have been killing people three years, and if we recommend our different companies at this meeting to adopt some kind of power-brake on their passenger-trains, if they do not adopt it any faster than we discuss the matter, we shall not get power-brakes on the trains for the next seven years. That is pretty certain. We need not tell them what brake to adopt, we can leave that to them; but I think we are all of one opinion, that it is really necessary to have a power-brake on our trains, and I think you will all agree with me, that it is a great deal better to have a bad power-brake than no brake at all. Our roads will perhaps take twelve months to consider what kind of brake we will have. By that time, all the improvements that are necessary will be completed, and perhaps we shall have by next year the thing carried out. I hope they will go to work a little faster than we do. I think it is very important that we should take action on this subject to-night.

MR. E. VARNEY.—I do not understand that this brake committee had any thing to do with power-brakes at all; and I do not think it necessary for us to take any action in regard to power-brakes. Our officers generally take that matter into their own hands. If they want something of that kind, they will, perhaps, consult the master car-builder to know which is the best brake, and get his opinion on it.

MR. F. CHILDS.—I will simply say that our company have been trying to find out which is the best power-brake for the last six months. They will do that for themselves; they won't leave us to do that.

The question on the motion to continue the committee was then put, and carried.

BUSINESS FOR NEXT ANNUAL MEETING.

MR. I. W. VAN HOUTEN, from the committee appointed to present subjects for consideration at the next annual meeting, made a report, recommending that the following topics be proposed for consideration at such meeting, and that a special committee be appointed to report upon each:

First. The best kind of bumper and bumper-springs to be used.

Second. The best manner of framing passenger and freight equipment-cars, with plans illustrating such method.

Third. The best size of freight-car bodies, taking into view the best interests of the respective companies.

Fourth. The propriety of forming a Beneficial Society, consisting of all the members of this association, with a plan of such organization.

Fifth. The propriety of opening rooms in Boston, Philadelphia, Chicago, and other large railway centres, as places of registry and resort for master car-builders and others when visiting such places—such rooms to be maintained without expense to this association.

Sixth. The best appliances to replace cars on the track, when thrown off by accident or otherwise.

The report was adopted.

SUNDRY COMMITTEES APPOINTED.

The Chair announced the following committees:

On Oil-Box and Journal-Bearing Patterns.—Messrs. C. A. Smith, Erie Railway; I. W. Van Houten, Penn. R.R.; Joseph Jones, N. Y. Central and Hudson River; D. Hoit, Toledo, Wabash, and Western; and F. D. Adams, Boston and Albany.

On Exhibition of Models, Machinery, etc., at next Annual Meeting.—Messrs. W. H. H. Allison, Cin., Ham., and Dayton; and D. Hoit, Toledo, Wabash, and Western.

On Arrangements for holding next Annual Meeting.—Messrs. W. H. H. Allison, Cin., Ham., and Dayton; D. Hoit, Toledo, Wabash, and Western; Samuel Griffith, Ind., Cin., and Lafayette; and John McVay, Pittsburg.

On Car-Roofs.—Messrs. C. A. Smith, Erie Railway; and George Hackett, Central R.R. of New-Jersey.

On the Association Rooms in New-York City.—Messrs. I. W. Van Houten, President; V. D. Perry, Vice-President; A. Steinbach, Treasurer; L. Garey, Secretary; M. N. Forney, and C. A. Smith.

On Draw-Bars and Buffers.—Messrs. F. D. Adams, Boston and Albany; C. A. Smith, Erie Railway; and Joseph Jones, New-York Central and Hudson River.

On Truck and Car-Body Check-Chains.—Messrs. H. O. Wadlie, Illinois Central; J. W. Calais, Wilm., Col., and Augusta; and J. N. King, Chesapeake and Ohio.

On the Size and Framing of Passenger and Freight-Cars.—Messrs I. W. Van Houten, Penn. R.R.; C. A. Smith, Erie Railway; and Samuel Campbell, Jackson and Sharp Co,

On Propriety of Forming Beneficial Society.—Messrs. G. W. Demarest, Northern Central; and W. R. Davenport, Erie Car-Works.

On Propriety of Opening Master Car-Builders' Rooms in large Cities and Railway Centres.—Messrs. W. W. Wilcox, Chicago, Burlington, and Quincy; J. W. Holmes, Atlantic and Great Western; and D. Hoit, Toledo, Wabash, and Western.

On Appliances for Replacing Cars on Track.—Messrs. J. W. Calais, Wil., Col., and Augusta; J. N. King, Chesapeake and Ohio; and H. Longest, Rich., Danville, and Piedmont.

On Heating, Lighting, and Ventilating Passenger-Cars.—Messrs. W. E. Chamberlain, Boston and Albany; V. D. Perry, Hartford, Prov. and Fishkill; and A. Gleason, Old Colony and Newport.

On Car-Couplers.—

OFFICERS FOR ENSUING YEAR.

MR. R. S. RAMSEY, Pennsylvania Railroad, from the committee to present names for officers of the association for the ensuing year, made a report recommending Mr. M. P. Ford, Pittsburg, Cin., and St. Louis, for President; V. D. Perry, Hartford, Providence, and Fishkill, for Vice-President; A. Steinbach, Phila. and Reading, for Treasurer; and Leander Garey, New-York and Harlem, for Secretary.

Mr. Ford, while he duly appreciated the honor proposed to be conferred, positively declined being a candidate for the office of President.

The subject was then recommitted to the committee, who subsequently reported the names of Mr. F. Childs, and other gentlemen, who severally declined. After several ballots, the following gentlemen were elected as officers of the association to serve during the ensuing year:

President, I. W. VAN HOUTEN, Philadelphia, Pa.
Vice-President, V. D. PERRY, Hartford, Ct.
Treasurer, A. STEINBACH, Reading, Pa.
Secretary, LEANDER GAREY, Morrisania, N. Y.

THANKS.

Mr. M. N. Forney, from the Committee on Resolutions, reported for adoption the following:

Resolved, That the thanks of this association be given to the Mayor, and also to the Executive Committee, merchants, and other citizens of Boston, who have received the members of this association so cordially, and entertained them so hospitably; to the committee of arrangements of this association, for the admirable manner in which they have prepared for its deliberations and for the comfort of its members during their stay in this city; to the Westinghouse and Smith Vacuum Brake Companies; the Boston and Maine, the Boston and Lowell, and the Eastern Railroad companies and their officers, for the pleasant and profitable excursion and experiments provided for the car-builders and their associates; to Mr. George Armstrong, proprietor of the Boston and Albany Railroad Baggage Express, for furnishing transportation for the baggage of the members; to the various railroad companies who have passed the members over their lines to and from this convention; to gentlemen from New-York and elsewhere, for their ministrations to the comfort and pleasure of members on their journey to the convention, and for their invitation extended for our return to New-York; to the Pullman Palace-Car Company, for providing cars for the members; to the Woodruff Palace Sleeping-Car Company, for a tender of their cars; to the members of the Boston press for their careful reports and flattering consideration; to Mr. Robert Loudon and other gentlemen, for their politeness and attention to the ladies who accompanied the members during their visit to Boston; and to the proprietors of the American House for their hospitality and good cheer.

The resolution was unanimously adopted.

THE STANDARD AXLE.

On motion of Mr. C. A. Smith, the following resolution was adopted:

Resolved, That the Committee on Axles be instructed to prepare a circular, to be addressed to the managers of the various railroads, setting forth the action of this association in recommending a standard axle, and asking that authority be given for its adoption.

On motion of Mr. Garey, the convention then adjourned to meet in the city of Cincinnati, on the second Wednesday of June, 1874.

Entertainments.

THE members of the Master Car-Builders' Association, together with their friends, and the ladies accompanying them, were most agreeably entertained during their stay in Boston. The arrangements for this purpose were most judiciously planned and effectively carried out by an executive committee representing a number of the merchants, manufacturers, and business men of the city. On Wednesday evening, the visitors were provided with over 300 tickets for reserved

seats in the Boston Theatre; on the afternoon of the following day, they were favored with a delightful steamboat excursion among the islands of the harbor, with the accompaniments of music and a bountiful collation—about 400 being on board. On Friday afternoon, the visitors were treated to a carriage-ride to the suburbs and various points of interest in the vicinity of the city. Seventy-five open barouches were provided for this purpose, and proceeded in separate parties in various directions. The favorable weather contributed greatly to the enjoyment of these hospitalities; but they were especially enjoyable from the admirable manner in which they were arranged and carried out—indeed, the committee organization was so entirely invisible, that the theatrical entertainment, harbor excursion, and carriage ride, seemed like purely impromptu affairs got up without effort or premeditation. This is the test of good management on such occasions, and the results will long be remembered and appreciated by the visitors.

The following are the names of the gentlemen constituting the committees.

General Executive Committee.—Henry C. Sherburne, Chairman; E. C. Perkins, Treasurer; H. F. Knowles, Secretary; Silas H. Munson, John A. Pingree, Charles S. Knowles, J. F. Hudson, Thomas C. Lothrop, Robert Loudon, George Buntin, H. K. Moore, H. L. Leach, Philip S. Page, and F. A. Howard.

Harbor Excursion Committee.—S. H. Munson, John A. Pingree, and C. S. Knowles.

Theatre Committee.—E. C. Perkins, J. F. Hudson, and Thomas C. Lothrop.

Carriage Committee.—H. C. Sherburne, Robert Loudon, George Buntin, and H. K. Moore.

On Saturday morning, a large number of the members took their departure for Newport, under the auspices of a committee representing various merchants and manufacturers of New-York, engaged in the railway supply business. The committee consisted of Gen. E. S. Greeley, Albert Brady, R. R. Wood, Col. R. E. Ricker, C. Roby, L. Valentine, and C. W. Kalkman. On arriving at Newport, the party were conveyed in carriages to the Atlantic House, where a collation was served. A drive on Cliff Avenue followed, and a general inspection of the many attractive features of this famous old town. Dinner was served toward night, after which the party proceeded to New-York by the magnificent steamer Bristol—their Boston friends returning by the morning boat to their homes.

Communication.

SPRINGFIELD, MASS., June 9, 1873.

EDITOR OF THE NATIONAL CAR-BUILDER:

DEAR SIR: I notice in the last number of your paper a communication signed "Veteran Car-Builder." I do not understand precisely what is signified by this term, but I should naturally infer that the writer must have that experience in his vocation which can only be derived from age and long service; and it may seem presumptuous in me to advance an opinion in conflict with his own. But let us consider a moment. He says it would be very unwise for our railroads to adopt that "ponderous, unmeaning mass of iron called the Adams axle," (I did not know before that I was entitled to the credit of the proposed axle, although I wish I was,) "that a few men may guess or imagine it to be better than the size now in general use," etc.; and then he proceeds, himself, to guess or imagine that what is a fixed and positive law of friction has no foundation in truth, although sustained by the best scientific writers employed by the French government, and also by scientific men employed by our own government, to test the matter by actual experiment and careful investigation; and who have established the fact that friction is caused entirely by weight or pressure, and is altogether independent of the surface measurement of the journal. In this case we do not guess or imagine at all, but state what has been demonstrated beyond all successful contradiction, when we say that a load of ten tons will run easier on a 4 by 7-inch journal than on a 3¼ by 5, which is the size of many in use. I would suggest that "Veteran Car-Builder" ought not to *suppose* in such cases unless he is willing to allow others to *guess*. But we want no guessing or supposition about it. I have heard of very old and experienced people who had serious doubts as to whether the earth turned on its axis every twenty-four hours.

F. D. ADAMS.

THE Indianapolis, Bloomington, and Western Railroad Company have purchased and placed upon their road four of the most elegant new day-coaches ever seen on a western road. They are contructed on six-wheel trucks, and are six feet longer and considerably higher than the coaches formerly used, and the interior of them is most elaborately and extravagantly furnished, excelling in comfort and elegance the most sumptuous of the celebrated Pullman cars.

The National Car-Builder,

PUBLISHED MONTHLY,

BY

VOSE, DINSMORE & CO.,

32 WARREN STREET, NEW-YORK; 52 FIFTH AVENUE, CHICAGO; 720 NORTH SECOND STREET, ST. LOUIS.

JAMES GILLET, EDITOR.

Terms, One Dollar per Annum.

JULY, 1873.

Editorial Announcements.

CORRESPONDENCE.—*We cordially invite the coöperation of the railroad public in affording us the material for a good mechanical paper. Articles relating to rolling-stock and machinery, by those practically acquainted with those subjects, will be gratefully received. All communications must be addressed to Vose, Dinsmore & Co., No. 32 Warren Street.*

The name and address of the writer must accompany all communications designed for publication.

ADVERTISING RATES.—*For one square, or one fifth of a column, $5 per month, or $50 a year. For half a square, $3 per month, or $25 a year. Larger advertisements by special contract.*

All communications in regard to advertising should be addressed to L. F. DINSMORE, *Post-Office Box* 4055, *New-York City, who is our agent for advertising, and authorized to make contracts, collections, etc.*

The Master Car-Builders' Convention.

WE devote the present number of our paper almost exclusively to the proceedings of the Master Car-Builders' Association, which closed its seventh annual convention, at Boston, on the 13th ult. The attendance was larger than at any previous meeting, a large number of roads being represented, and also several car manufacturing establishments. The very full report which we give, including the discussions upon the various topics presented for consideration, will enable the reader to form an idea of the business transacted and the spirit which characterized the deliberations. Like other assemblages of a similar kind, convened for the purpose of promoting the interests of our railways, the convention was composed of practical men, whose business it was to deal with mechanical questions in which the general public is largely interested, and upon the intelligent solution of which the safety and well-being of every individual in the community more or less depend. The delegates, as a body, being unacquainted with the science of circumlocution and technical hair-splitting, the business of the convention was transacted in a business way, with a view to speedy practical results.

The extension of our railway system from year to year, has rendered some action imperatively necessary to secure uniformity in the various parts of car-trucks. The convention has taken the first step toward bringing about this result, by recommending for the adoption of the various roads, a standard size of axle and journal, to which all new work in future is to be conformed. The dimensions are as follows: Length of axle between collars, 6 feet 10 inches; diameter at wheel seat, 4¾ inches; diameter at centre, 4 inches; length of journal, 7 inches; diameter of journal, 3¾ inches. This result was reached after a prolonged discussion which elicited much diversity of opinion, more particularly with respect to the diameter of the journal, and may be considered as a very fair compromise between what may be termed the radical and conservative extremes. In order to test the wisdom of this decision, it only remains for road managers to carry it into practical effect, and in a few years there will be an approximation, at least, to uniformity in the matter of axles and journals. We trust that the apprehension existing in the minds of many, that an increase of journal-surface will necessarily increase friction, will not prove a serious obstacle to the adoption of the standard dimensions recommended by the association. This theory in regard to friction is a very plausible one; but its correctness is not sustained by experimental tests. The progress of mechanical science hitherto has exploded many theories equally plausible—indeed, the great majority of people now believe that the earth turns around, notwithstanding the steadfast upright position of Bunker-Hill monument. The discussion on this point is very interesting, and will no doubt lead to more careful investigation and a better understanding of the matter. A committee was appointed to determine upon a standard pattern for an oil-box and journal-bearing, and to have iron patterns of the same made for supplying such roads as may order them.

The Committee on the Warming and Ventilation of Cars made an interesting report, which will be found in its proper place in the proceedings. The discussion which followed is very fully reported, and will repay careful perusal. It very clearly shows that the satisfactory ventilation of cars is not a problem to be easily solved, and that car-builders have not given the subject the attention it deserves. No specific action was taken as to means and methods, and the subject was deferred until the next meeting, and the committee continued. The completion of the Dictionary of Terms proves to be a more formidable undertaking than was at first supposed, and several months will be required to get it ready for publication. The committee were authorized to draw on the treasurer for $800 to defray the necessary expenses.

The Committee on Brakes submitted an elaborate report, embodying much practical information arranged in tabular form. Its great length precludes its insertion in its proper place in the proceedings. It will be published in the official report at an early day. In reference to power-brakes, the committee favor the adoption of the Westinghouse. The replies to circulars indicate that the majority of roads do not use safety train-brakes. Several use the Creamer brake with satisfactory results, and consider it reliable in all temperatures, but not under the entire control of the engineer. The committee was continued another year for the purpose of further investigation.

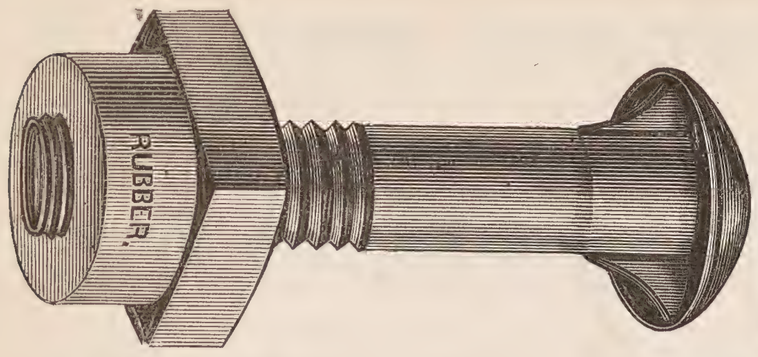
During the session of the convention, attention was called to the numerous accidents in coupling cars, and a committee was appointed to investigate and report upon the subject. A resolution was also adopted providing for an exhibition of inventions, machinery, and materials used in car construction, at the time and place of the next annual meeting, and a committee was appointed to make the necessary arrangements.

With this brief reference to the doings of the convention, we refer our readers for further particulars to the extended report we publish. Our paper has been delayed a few days in consequence of an accident which compelled us to have a considerable quantity of manuscript rewritten from the reporter's notes.

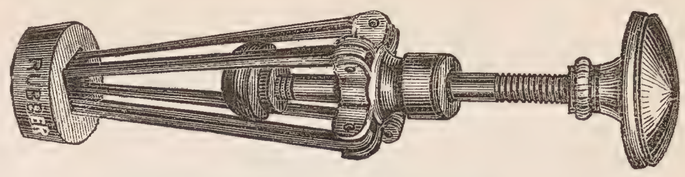
THE great length of the proceedings of the Car-Builders' Convention, and the pressure of advertisements upon our columns, have compelled us to leave out of our present issue the directories of railway officers and car manufacturers, and also our usual variety of miscellaneous reading matter.

IT is said that a New-York firm is about to patent an invention consisting of the use of three wheels upon each side of railroad cars, they being situated at equal distances from each other under the car, one of them being placed under the centre of the car. It is said by some of the best engineers to be a success, and will soon be brought out for practical demonstration.

THE Grand Trunk Railway Company have issued orders for a large amount of new rolling stock, all to be ready by October, when the equipment for the whole line west of Montreal will take place. To effect these changes, almost every iron workshop and car company in Canada will be engaged. Orders have been given out for 150 locomotives of great power, 500 box freight-cars, 200 platform-cars, 100 cattle-cars, 20,000 trucks for freight-cars, and 20 second-class passenger-cars for business; all of the above rolling stock, including the locomotives, to be adapted to the new gauge of the road, which, as has been stated, is to be conformed to the gauge in general use in the United States.



PLATT & KITZMILLER'S
PATENT
Rubber Nut-Lock.



"SPREADER" for applying Rubber to Bolt.

The most effective, durable and economical Nut-Lock ever invented. It keeps nuts closely and permanently in place on Fish-Plate bolts, Car-Trucks, Carriages, Engines, Bridges, and all kinds of Machinery, where they are liable to be jarred or shaken loose. It is made of the best quality of Rubber, is not affected by heat, cold or moisture, and can not be removed except by a wrench applied to the iron nut, in which case it leaves the bolt intact, and is again ready for immediate use. It has been severely tested on railroads and various kinds of machinery without a single failure. By its use, half the weight of iron nuts can be saved, and a shorter bolt used. Apply to

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32 Warren Street, cor. of Church, N. Y.

ALFRED W. LADD,
5 and 7 Dey Street, New-York,
DEALER IN
LOCOMOTIVES
OF EVERY DESCRIPTION.

Palace, Pullman, Passenger, Box, Platform, and Gondolas, and all kinds of Dumping and Construction

RAILROAD CARS,

And all RAILROAD MATERIALS, including

Rails, Fish-Plates, Turn-Tables, Chairs, Chains, Bolts, Nuts, Spikes, etc., etc.

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CAR TIMBER,

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BRIDGE TIMBER.

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MANUFACTURED BY THE

St. Louis Tripoli Company.

For Scouring and Polishing any kind of Metal, this TRIPOLI works more rapidly, and gives a finer surface than Flour of Emery.

For Scouring, use with oil, after which, use dry for Polishing.

This gives all metals a fine lustre, and resists the action of the atmosphere very well. Bulk for bulk, it is only half as heavy as Emery, and one pound of the TRIPOLI will do more and better work than two pounds of Emery. For cleaning GLASS, such as Car Windows, it is especially valuable, as it will not paste or adhere to the frame or sash. It is very much superior to Whiting or any other substance we know of for this purpose.

PRICES.

In small packages, - - - - 10 cents per lb.
In Kegs of about 175 lbs. each, 7 " "

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Reflectors Re-plated, Gauges of all kinds and Locomotive Balances Repaired at Short Notice.

CAPITAL, $100,000.

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KEROSENE HEAD LAMPS,

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For Strength, Beauty of Finish, Luster of Reflector, and Power to throw light a great distance, the Lamps of our manufacture stand unrivaled. Testimonials from prominent Railroad Officers all unite in pronouncing our **Patent Head Lamp**

THE BEST BURNING LIGHT EVER SEEN.

Conductor Lamps, Railroad Hand Lanterns of all Colors, etc. Initials of Roads and Names Marked on Glass.

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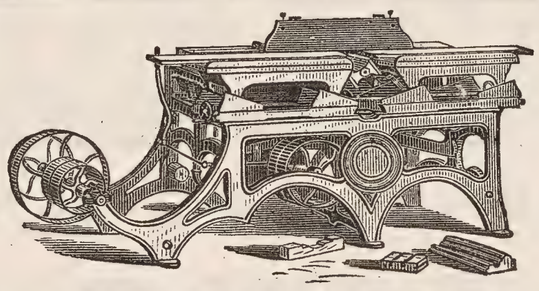

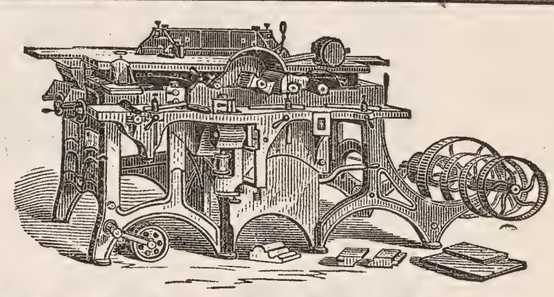

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Charcoal Roofing Plates,

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AND ALL METALS NECESSARY FOR

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A Safe, Durable, and Cheap covering for Steam Boiler Pipes, etc.

Saves from 25 to 40 per cent in fuel.

Superior to Hair Felt or Clay Materials.

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Highest Premium awarded by the American Institute Fair, 1871.

TRADE MARK. PATENTED.

An Indestructible Coating for Iron, Tin, and Wood.

Prince's Metallic Paint

Is acknowledged, wherever known, to be the

BEST AND CHEAPEST PAINT IN THE MARKET.

N. Y. CENTRAL & HUDSON RIVER R. R. CO. SUPPLY DEP'T,
ALBANY, N. Y., October 25, 1871.

GENTS.: Our Company have used your Metallic Paint for several years. For freight-cars, car-roofs, and buildings it has given us entire satisfaction. Yours, etc.,
M. H. ST. JOHN, Supply Agent.

OFFICE OF J. B. & J. M. CORNELL PLAIN AND ORNAMENTAL IRON WORKS,
NEW-YORK, November 10, 1871.

GENTLEMEN: We have used the Prince's Metallic Paint for several years, and believe it to be the best metallic paint for iron work now in use. Yours, etc., J. B. & J. M. CORNELL.

For Sale, Dry and in Oil, by the Trade, and by

PRINCE'S METALLIC PAINT CO.,

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96 Cedar Street, New-York.

☞ All packages are marked with name and trade-mark.

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Tin and Roofing Plates

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106 AND 108 FULTON ST. N.Y.

PREPARED EXPRESSLY FOR THE FINEST DESCRIPTION OF

Car and Locomotive Decoration.

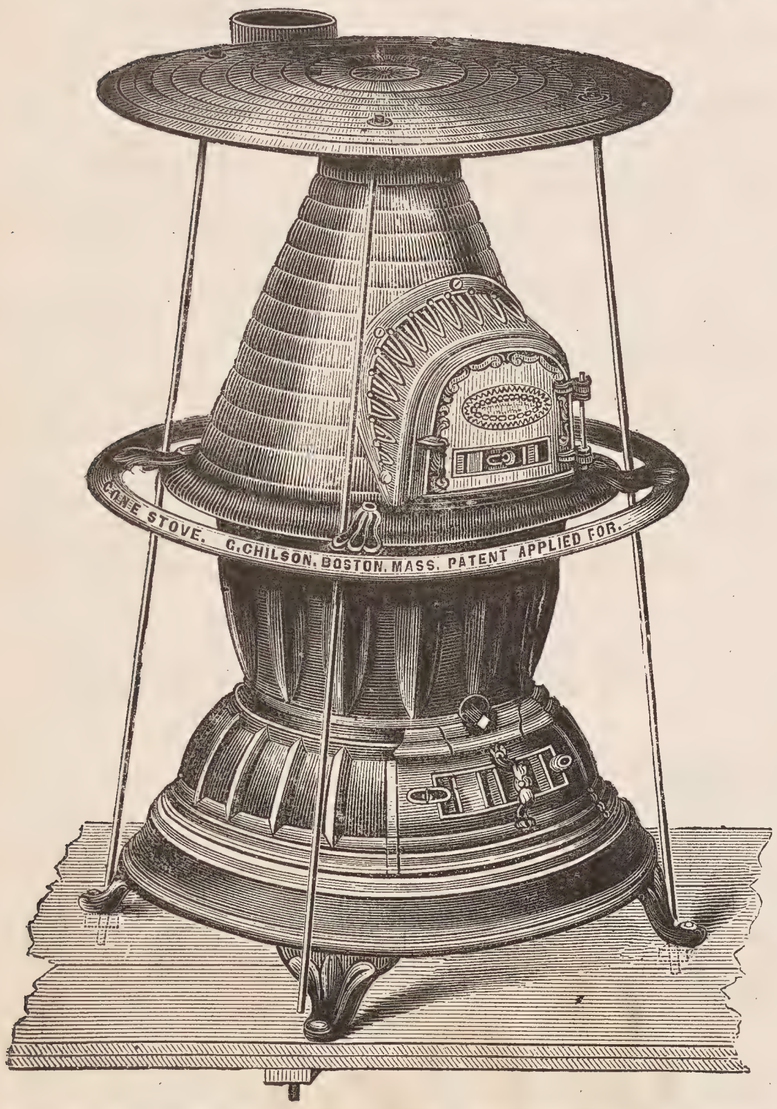
OUR OWN SPECIAL BRANDS OF SUPERIOR RAILWAY VARNISHES,

Are now used by some of the most extensive Railroads in the country, and are particularly recommended.

A NEW RAILWAY CAR STOVE.

Chilson's Patent Cone Disk Stove

ON A NEW AND MODEL PLAN.



I WOULD respectfully call the attention of Railway Managers and others interested in warming Railway Cars, Station Houses, etc., to this Stove, which has been thoroughly tested on several of our railways for a few years past, and has proved in every instance the most successful plan yet devised for thoroughly warming Railway Cars. This Stove is on a new and model plan, differing in principle and operation from all others in the United States. I claim for it *Safety, Economy, Durability, Simplicity, Cleanliness, and Beauty of Design.* Its peculiar merits may be stated as follows:

1. The conical radiator holds the hot smoke and gases back near the fire until they are thoroughly consumed, and the heat is rapidly radiated from the tapering surface of the cone.
2. The broad radiating disk prevents the heat from ascending to the upper part of the car or room, but distributes and throws it down to the floor, thoroughly warming the lower currents of cold air in the car or room for a great distance around the Stove, thus securing the long desired object of making the *lower part of the car and floor comfortably warm, especially for the feet.*
3. It is constructed in the most substantial and durable manner, from a new and beautiful design, wholly of *cast iron*, hence is not subject to the repairs of common stoves.
4. It is perfectly *safe*, being well secured against *accidental fires by being bolted down to the floor and having locks on the doors, so that in case a car should be overturned, fire could not get out of the Stove.* The guard rail which supports the feet when warming them, also serves as a fender, preventing the clothing from coming in contact with the Stove.
5. There is no hearth for dirt, filth, and tobacco spittle to accumulate on, which insures *cleanliness around the Stove.*
6. This Stove keeps the fire for a long time, and although adapted for coal, yet wood can be burned in it equally well.

It will be highly appreciated by all in want of a superior heater for *Factories, Stores, Offices,* RAILROAD CARS, and STATION HOUSES, *School Rooms, Workshops, etc.*, and has especially proved itself to be the most successful plan yet devised for warming RAILROAD CARS.

The BOSTON AND PROVIDENCE RAILROAD COMPANY have over two hundred of these Stoves in use, and the BOSTON AND ALBANY and several other Roads are adopting them, with the most perfect success.

BOSTON AND PROVIDENCE RAILROAD CORPORATION,
Superintendent's Office, Boston, April, 1873.

GARDNER CHILSON, Esq.: *Dear Sir:* We have about two hundred of your new "Cone" Disk Stoves in use, (a part of them for nearly five years,) for warming Passenger Cars and Stations. I can truly say that they have given entire satisfaction. These Stoves possess many important advantages over any other we have ever used, viz.: for warming the floor and displacing the cold air in the lower part of the car, whereby they are rendered much more comfortable, especially for the feet, than by any other plan known to us. The Stove is more economical in the consumption of fuel, more substantial in construction, and consequently requiring less repairs than any other in use, and so securely constructed as to prevent fire from getting out of the stove even should the car be *overturned.* I cheerfully give my testimony in favor of this Stove, and commend it to all Railroad Managers. Yours, etc., A. A. FOLSOM, *Superintendent.*

Numerous other testimonials received from Railroads and other persons having these Stoves in use in Halls, Stores, etc., may be seen at office. Bolts are not required except for Cars and Steamboats.

Chilson's Improved Celebrated Cone Furnaces, for setting in Brickwork or in Portable Casings, Chilson's Unrivaled Double-Oven Brick Cooking-Range; Chilson's New and Splendid Arlington Portable Range; Chilson's very Superior Arlington Cooking Stove; Parlor, Office, and Store Stoves, Parlor Grates, Registers, Ventilators, etc.

Special attention given to putting up Furnaces and Ranges, and the ventilation of buildings in any part of the country.
☞ Nothing but strictly first-class work is manufactured by me. ☜

Warerooms, Nos. 99 & 101 Blackstone Street, Boston.
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GARDNER CHILSON.

VOSE, DINSMORE & CO.,

Importers, Manufacturers, and Dealers in

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Bronze and other Trimmings of the Latest Patterns constantly in Stock.

LOCOMOTIVE HEAD LIGHTS AND STEAM GAUGES,

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Messrs. PETIN, GAUDET & Cie. advise us that they have completed two new Mills, and are now able to fill all future orders for

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Tool, Drill, Frog Plates and Points, Cutlery, Rake, Axe, Hoe, Machinery, Spring, Wagon-Axle, Tire, Sword, Bayonet, Rifle, and Pistol, MADE TO ORDER.

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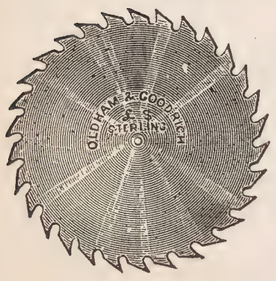
JOSHUA OLDHAM,



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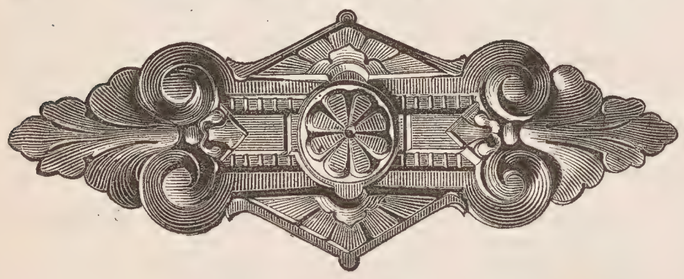

We invite the attention of the trade, including

Furniture Manufacturers, Builders, Interior Decorators, Stair-Builders, CAR BUILDERS, Architects. Steamboat Builders, Organ Manufacturers, and others,

To our variety of styles of ornaments, made to match black walnut in color, and which are perfectly fitted for use where not exposed to the weather. They have been sold extensively for several years, and have given entire satisfaction—so that all who have once used them have become constant consumers. They are artistic in design and unequaled in execution, being the production of the best artists, carvers, die sinkers, and moulders.

These ornaments hold glue and screws as well as carvings. They do not warp or crack. They are unaffected by changes of temperature, and withstand dampness as well as furniture. They will polish in every respect equal to wood, either with shellac, oil, wax, or varnish, and with less trouble, as there is no open grain to fill. They will gild or bronze beautifully by simply sizing, without any other preparation.

Our goods can be purchased of the Hardware houses in the various cities of the Union. Circulars mailed on application to

WILLIAM B. GLEASON & CO.,

Cor. West Camden Street, and Boston & Providence R. R.,

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For Lathes, Planers, Drills, Shaping Machines, Friction Clutch Pulleys, Gun and Sewing-Machine machinery of excellent designs and unexceptionable workmanship. Address,

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Bronzing and Coppering,

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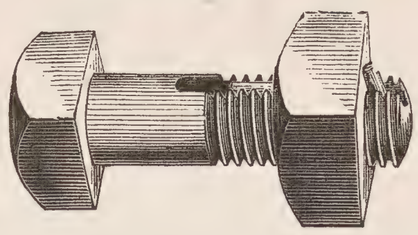
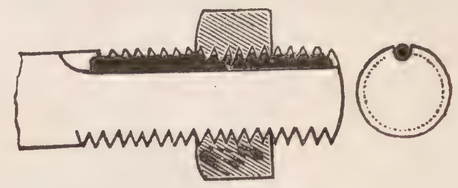
The Lock-Nut and Bolt Co., of New-York,

Office No. 61 BROADWAY, New-York.

Manufacturers of all kinds of BOLTS, for FISH-PLATES, CARS, BRIDGES, MACHINERY, ARRIAGES, &c., with the



"CUMMING NUT-LOCK,"
Patented
June 16, 1868,
August 23, 1870.



SECTIONS.

Unequaled for CHEAPNESS, SIMPLICITY & EFFECTIVENESS.

This simple device, as will be seen by the engravings, consists of a groove being cut in the threaded part of a screw bolt into which is placed a key of copper wire, or other soft metal; when the nut is screwed on, it cuts a thread on the key, thereby making it impossible for the key to get out until the nut is taken off. When the nut is screwed up to its place, that part of the key over which the nut has passed is riveted up against the nut with a small punch, destroying the thread on the key. The nut, therefore, can not move backward until force is used, as with a wrench.

The groove can be rapidly cut with a simple machine designed for the purpose.

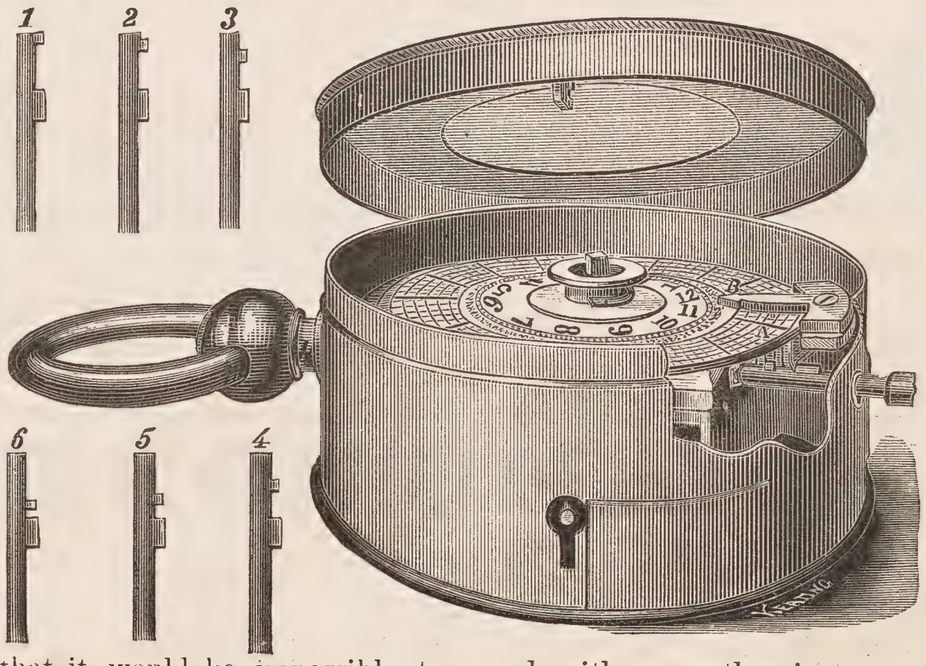
Experience has proved this device absolutely reliable, and it is the cheapest of all known devices for the purpose. By its use, old bolts on which the nuts have become too slack for use can be made as good as new, making it a great saving to railroad companies and others in that item alone. It is cheaper than a check-nut.

If the bolt should become slack from shrinking of timber or other causes, *the nut will always remain firmly attached to the bolt*, and, with the wrench, can be screwed up *any distance*, and the wire riveted up any number of times, or can be taken off without injury to the nut or bolt.

This is the only method in use that locks the nut firmly to the bolt without regard to place or surroundings, all others require some attachment that holds the bolt in its position, and a washer or other attachment to keep the nut from turning.

DIRECTIONS FOR USE.—Place the copper key in the slot, pointed end out, and beveled side up, in such a position that when the nut is screwed to its place about three-eighths of an inch of the key will project beyond its outer face. Then screw the nut to its place *over the key*, allowing it to cut its own thread in the copper. Then take a narrow flat set punch, and rivet the projecting part of the key *solidly* against the outer face of the nut. To tighten the nut: screw it up, and rivet the key tighter. To remove the nut: simply apply the wrench and unscrew the nut. It will cut its own way out through the copper. The same key can be used several times, by moving it outward a few threads in the slot.

BUERK'S WATCHMAN'S TIME DETECTOR,



Important for all large Corporations and Manufacturing concerns; capable of controlling, with the utmost accuracy, the motion of a watchman or patrolman, as the same reaches different stations of his beat.

The instrument is complete in itself, portable, and as reliable as the best lever watch.

It is not so likely to become disarranged in its works as a good watch, because its parts are stronger. But when it needs cleaning, any common watchmaker can adjust it, its mechanism being simple.

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The instrument will, in all cases, be warranted perfect and satisfactory.

☞ This Detector is covered by two United States Patents. Parties using or selling these instruments, without authority from me, will be dealt with according to law. Address,

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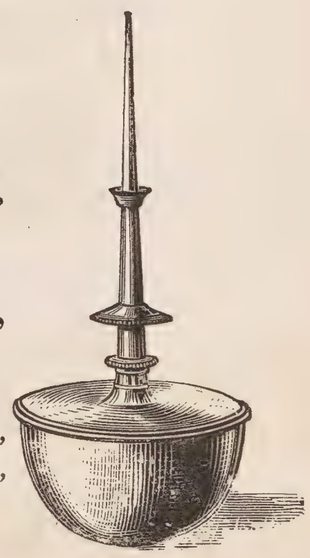
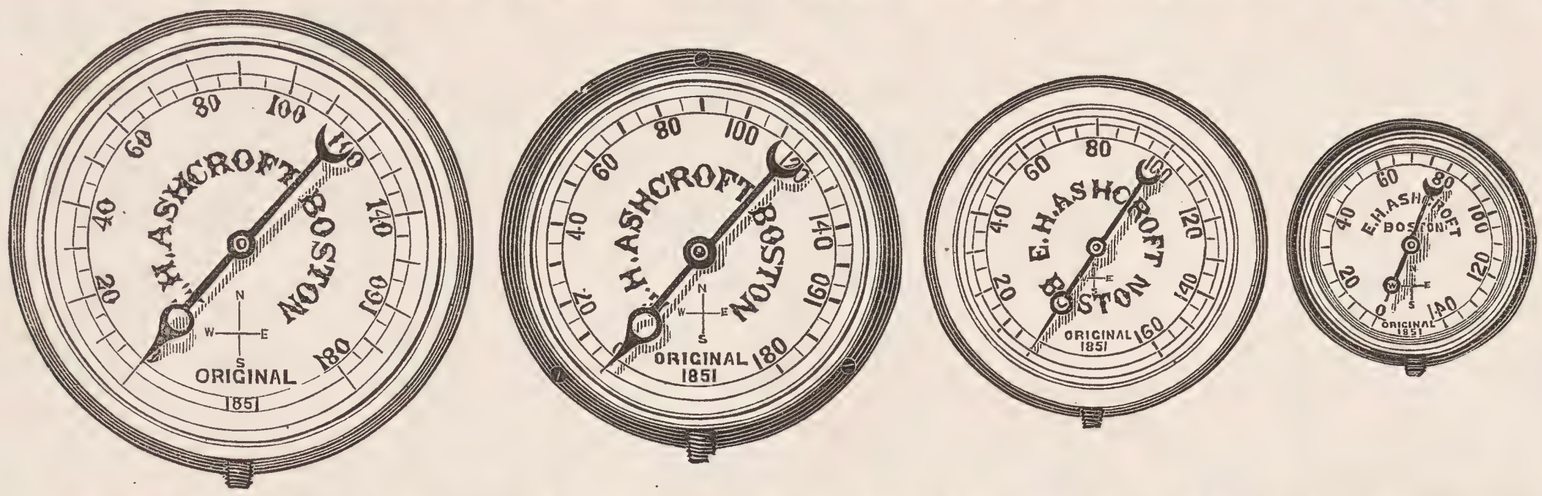


To Railroad Master Mechanics and Locomotive Engine Builders.



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The Ashcroft Bourdon Gauge is too well known to need any extended introduction, and we have endeavored by long experience to introduce improvements which the trade and railroad men can not fail to appreciate. ☞ *Total number of Gauges made over 100,000.*

☞ ALL GAUGES WARRANTED TWO YEARS. ☞ ALL GAUGES MADE BY MERCURY COLUMN STANDARD.

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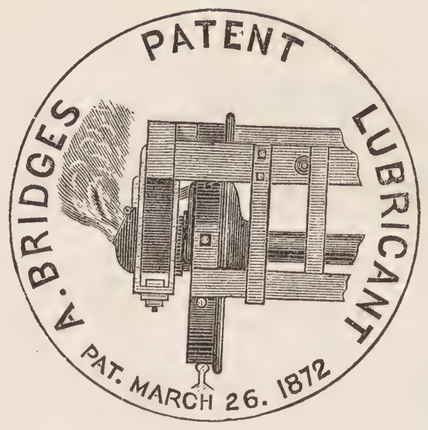

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It has been in use, during the past two years, on a number of Railroads and Steamers, and is highly approved of.

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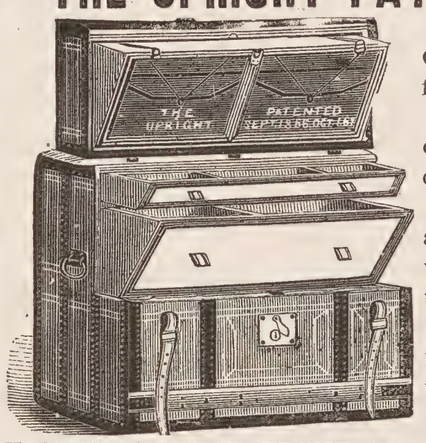

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Instead of trays to lift out, it is arranged with drawers.

It is STRONGER, as only a small portion opens, whereas in the old style the whole top comes off.

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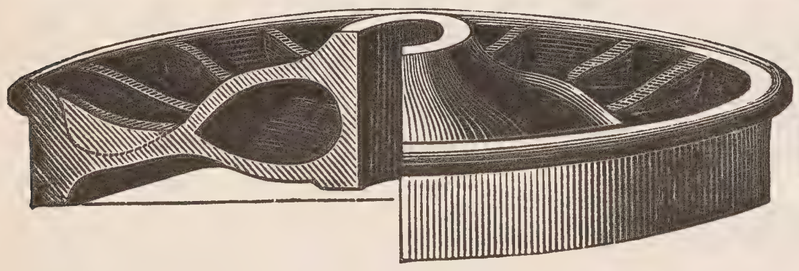

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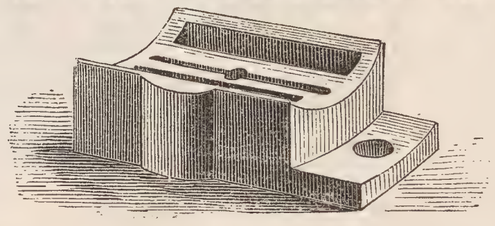

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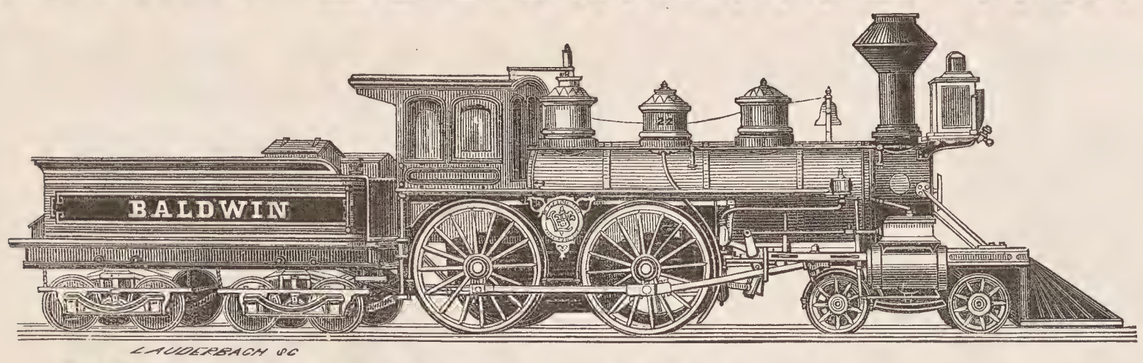

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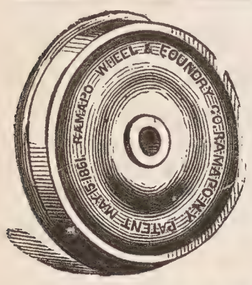

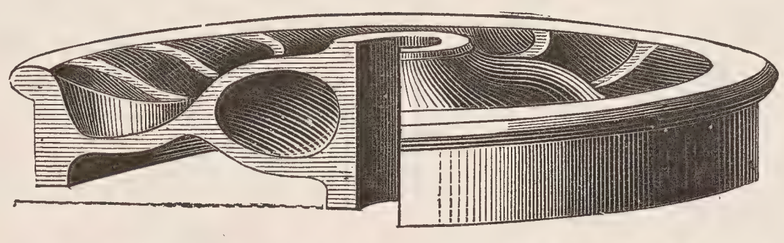

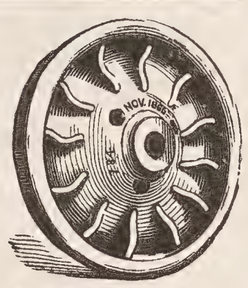

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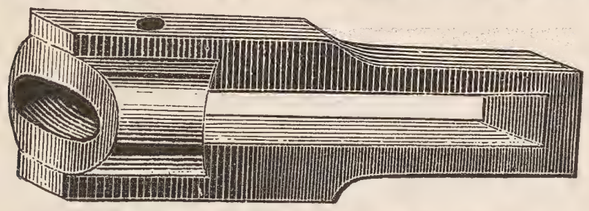

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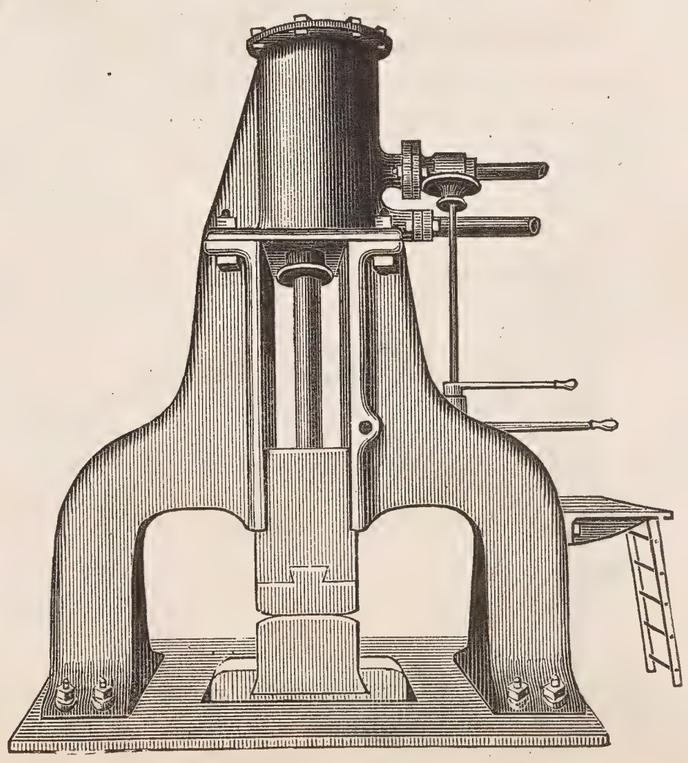

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Improved Paint Filling.

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From the many flattering testimonials received by the Patentee from the parties now using it a few only can be appended.

TESTIMONIALS.

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The article known as TULLY'S PATENT PAINT FILLER has been used for upward of three years by this Company, on Cars, Engines, Cabs, Wheels, Tenders, etc., etc., and find it an excellent substance for preparing fine surfaces, reducing the time usually spent in rubbing down one third. Wearing well, and with a fair trial, it will prove all that is claimed for it where introduced and placed before the public, as the best result of many years' experience obtained by a thoroughly practical Painter.

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We fully concur in the above.

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PHILIP HOFECK, *M. M., B M. Div.*
JOHN I. KINSEY, *M. M., L. V. R. R.*
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Having full confidence in the men whose signatures are attached hereto, I endorse all they say, and confidently recommend Mr. TULLY'S PATENT PAINT FILLER to all in want of an article of the kind.

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Superior Belgian Varnish Filler,	
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Directions for use accompany each package.

J. W. TULLY, Patentee and Gen. Agent.

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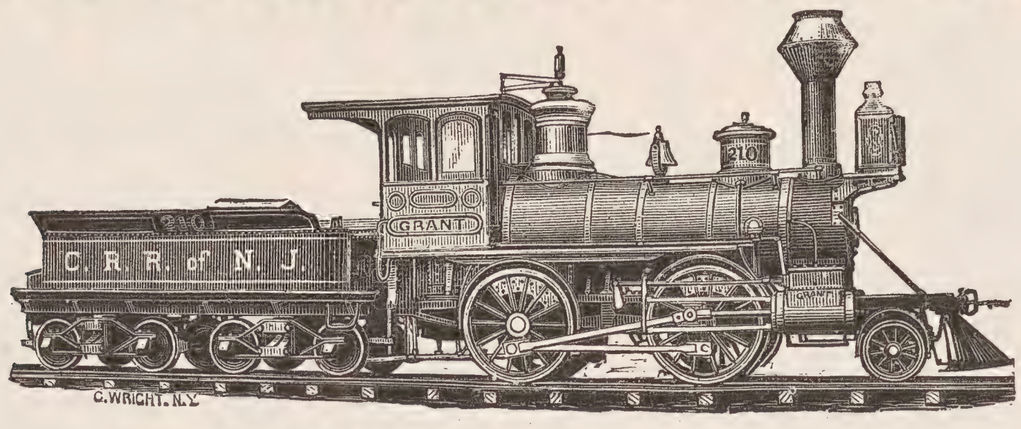

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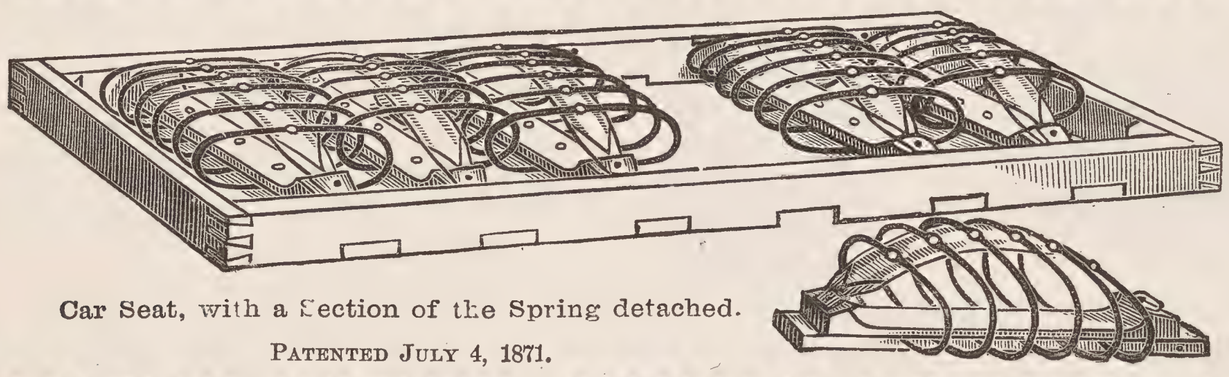

Car Seat, with a Section of the Spring detached.

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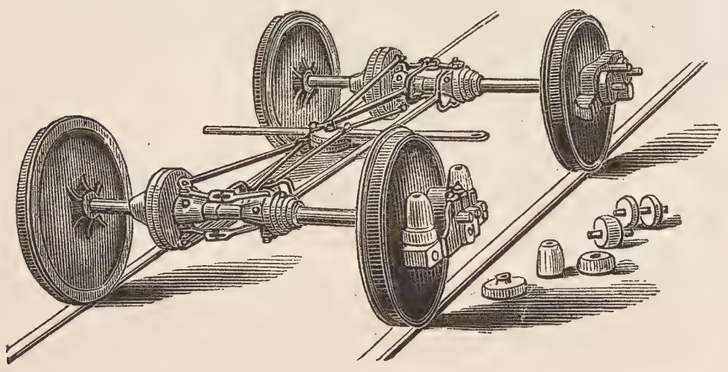

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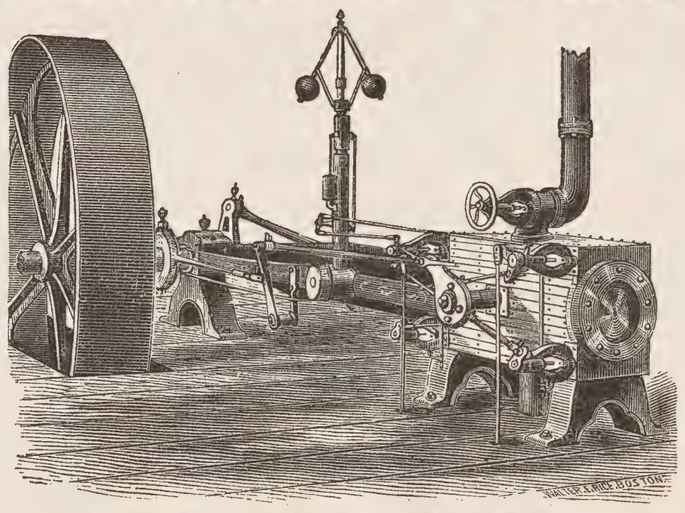

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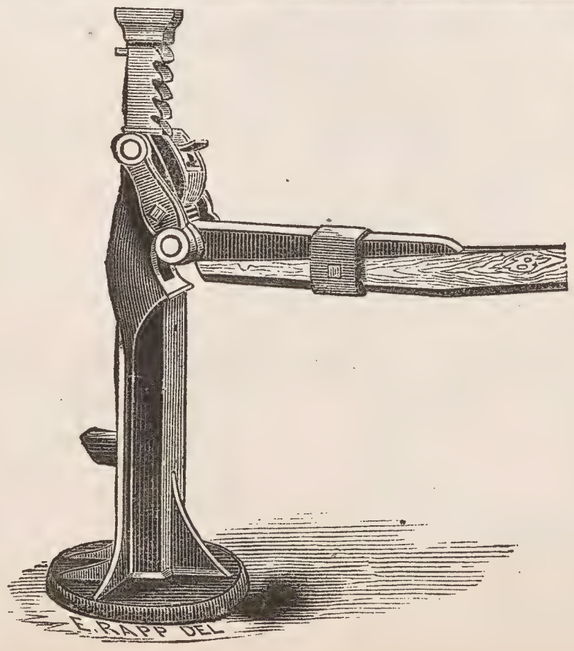

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OF THE MOST APPROVED STYLES AND PATTERNS,

Either Full Decorated, Part Decorated, Encaustic, or Printed and Plain,

At Short Notice and in the Most Satisfactory Manner.

Orders will be received at the Factory, in New-Haven, Ct., or by

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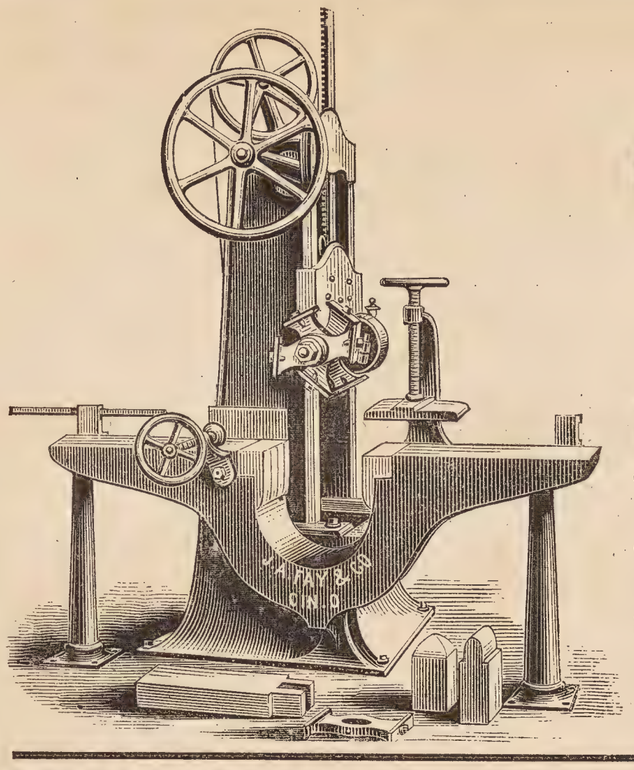

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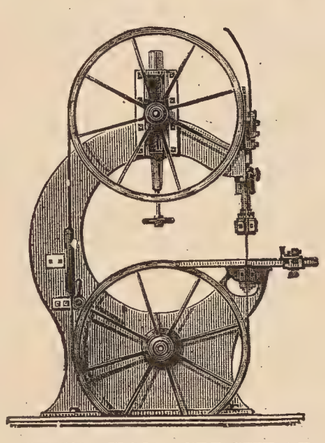

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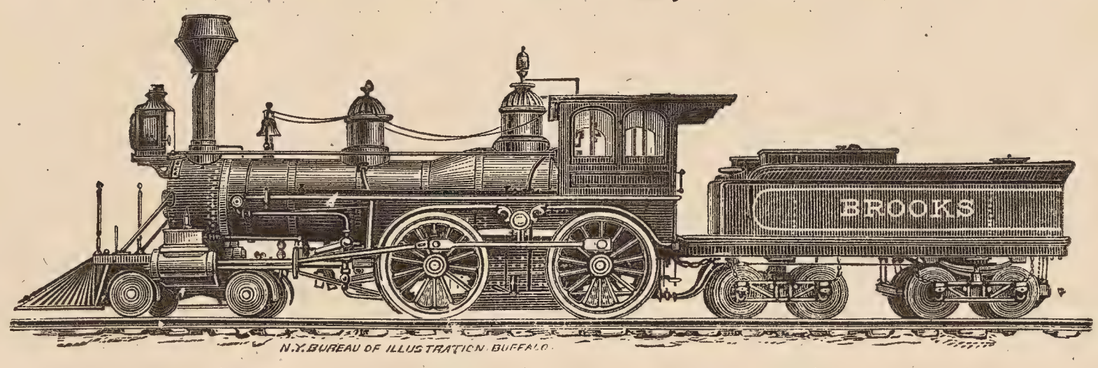

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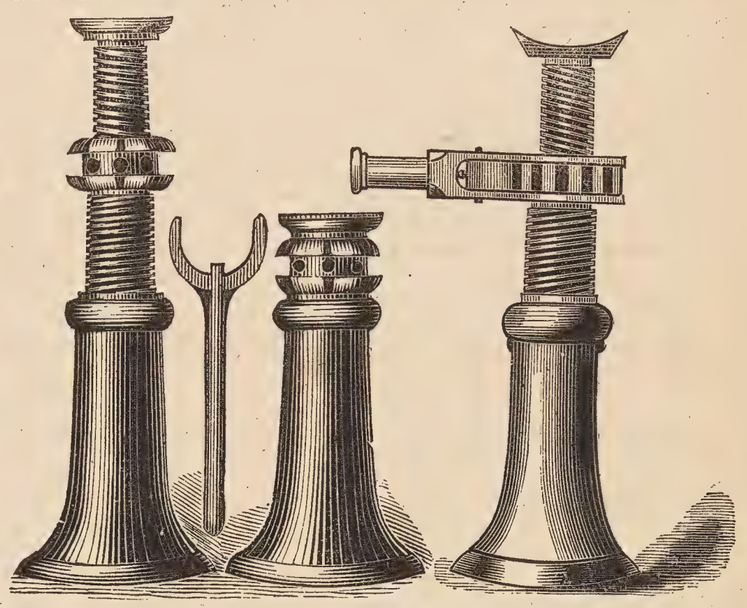

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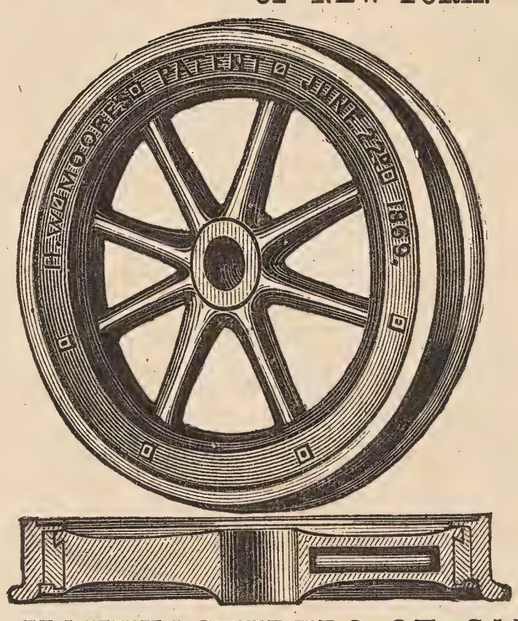

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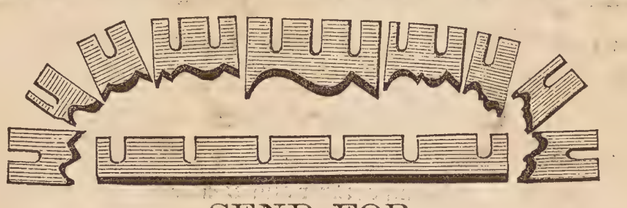

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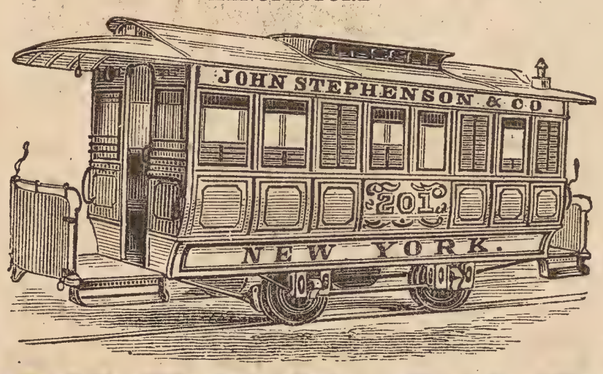

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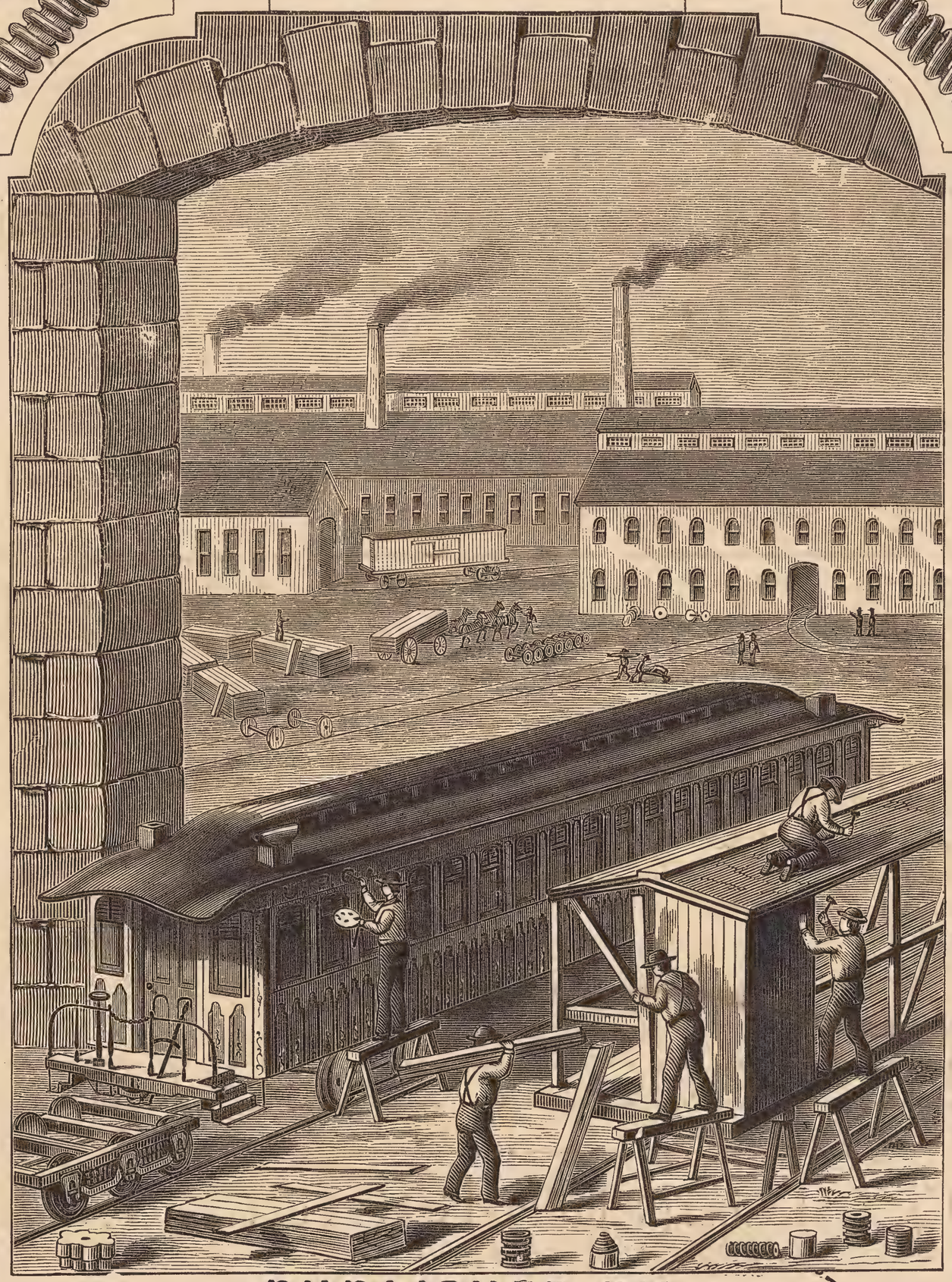
Devoted to the Interests of Railway Rolling Stock.

Vol. IV. AUGUST, 1873. No. 8.



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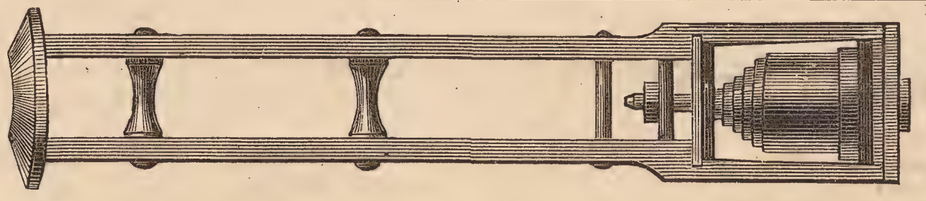

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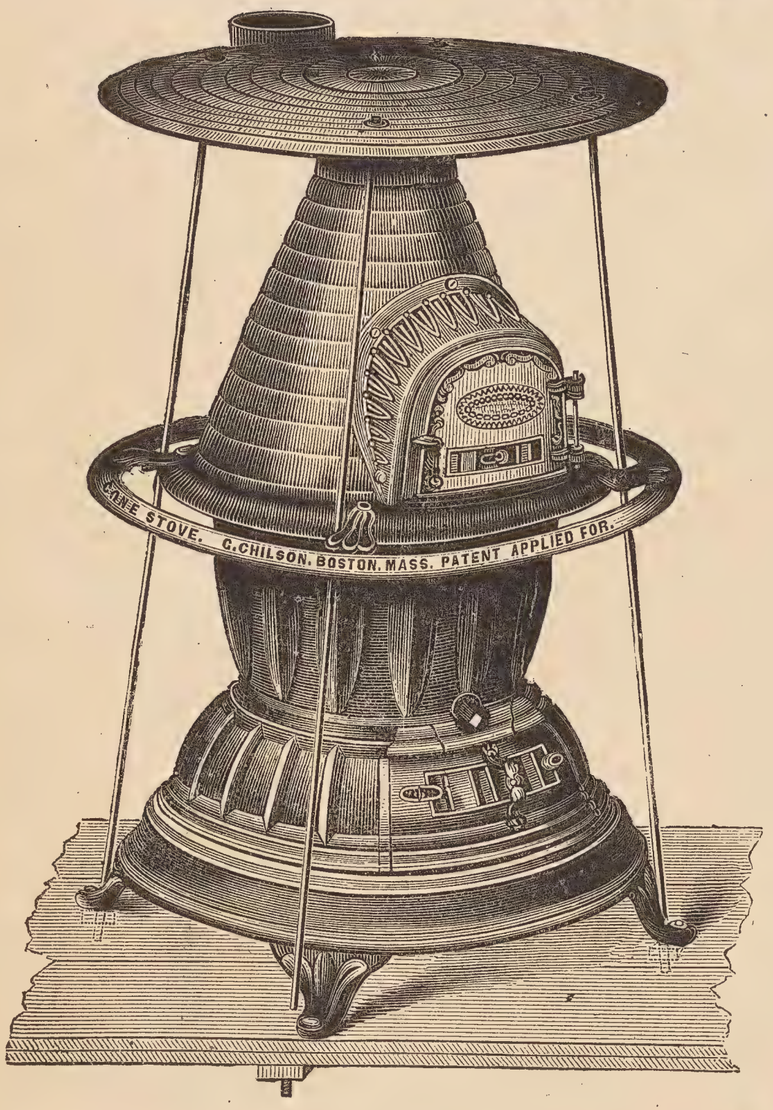
A NEW RAILWAY CAR STOVE.

Chilson's Patent Cone Disk Stove

ON A NEW AND MODEL PLAN.



I WOULD respectfully call the attention of Railway Managers and others interested in warming Railway Cars, Station Houses, etc., to this Stove, which has been thoroughly tested on several of our railways for a few years past, and has proved in every instance the most successful plan yet devised for thoroughly warming Railway Cars. This Stove is on a new and model plan, differing in principle and operation from all others in the United States. I claim for it *Safety*, *Economy*, *Durability*, *Simplicity*, *Cleanliness, and Beauty of Design*. Its peculiar merits may be stated as follows:

1. The conical radiator holds the hot smoke and gases back near the fire until they are thoroughly consumed, and the heat is rapidly radiated from the tapering surface of the cone.

2. The broad radiating disk prevents the heat from ascending to the upper part of the car or room, but distributes and throws it down to the floor, thoroughly warming the lower currents of cold air in the car or room for a great distance around the Stove, thus securing the long desired object of making the *lower part of the car and floor comfortably warm, especially for the feet.*

3. It is constructed in the most substantial and durable manner, from a new and beautiful design, wholly of *cast iron*, hence is not subject to the repairs of common stoves.

4. It is perfectly *safe*, being well secured against *accidental fires by being bolted down to the floor and having locks on the doors, so that in case a car should be overturned, fire could not get out of the Stove.* The guard rail which supports the feet when warming them, also serves as a fender, preventing the clothing from coming in contact with the Stove.

5. There is no hearth for dirt, filth, and tobacco spittle to accumulate on, which insures *cleanliness around the Stove.*

6. This Stove keeps the fire for a long time, and although adapted for coal, yet wood can be burned in it equally well.

It will be highly appreciated by all in want of a superior heater for *Factories*, *Stores*, *Offices*, RAILROAD CARS, and STATION HOUSES, *School Rooms*, *Workshops*, *etc.*, and has especially proved itself to be the most successful plan yet devised for warming RAILROAD CARS.

The BOSTON AND PROVIDENCE RAILROAD COMPANY have over two hundred of these Stoves in use, and the BOSTON AND ALBANY and several other Roads are adopting them, with the most perfect success.

BOSTON AND PROVIDENCE RAILROAD CORPORATION,
Superintendent's Office, Boston, April, 1873.

GARDNER CHILSON, Esq.: *Dear Sir:* We have about two hundred of your new "Cone" Disk Stoves in use, (a part of them for nearly five years,) for warming Passenger Cars and Stations. I can truly say that they have given entire satisfaction. These Stoves possess many important advantages over any other we have ever used, viz.: for warming the floor and displacing the cold air in the lower part of the car, whereby they are rendered much more comfortable, especially for the feet, than by any other plan known to us. The Stove is more economical in the consumption of fuel, more substantial in construction, and consequently requiring less repairs than any other in use, and so securely constructed as to prevent fire from getting out of the stove even should the car be *overturned*. I cheerfully give my testimony in favor of this Stove, and commend it to all Railroad Managers. Yours, etc., A. A. FOLSOM, *Superintendent.*

Numerous other testimonials received from Railroads and other persons having these Stoves in use in Halls, Stores, etc., may be seen at office. Bolts are not required except for Cars and Steamboats.

Chilson's Improved Celebrated Cone Furnaces, for setting in Brickwork or in Portable Casings, Chilson's Unrivaled Double-Oven Brick Cooking-Range; Chilson's New and Splendid Arlington Portable Range; Chilson's very Superior Arlington Cooking Stove; Parlor, Office, and Store Stoves, Parlor Grates, Registers, Ventilators, etc.

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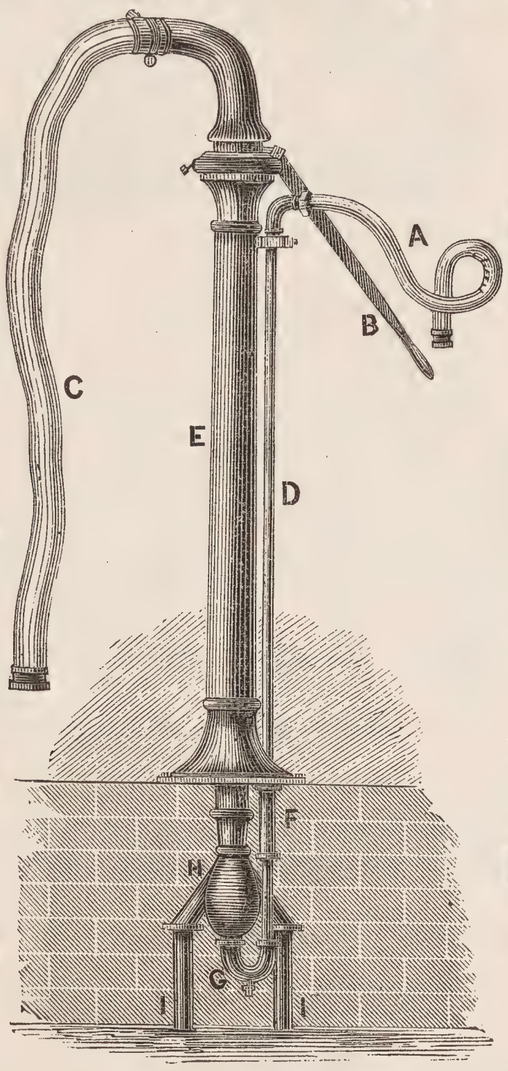
DISPENSES WITH **Tanks, Tank Houses, Stationary Power,** AND **Attendance.**

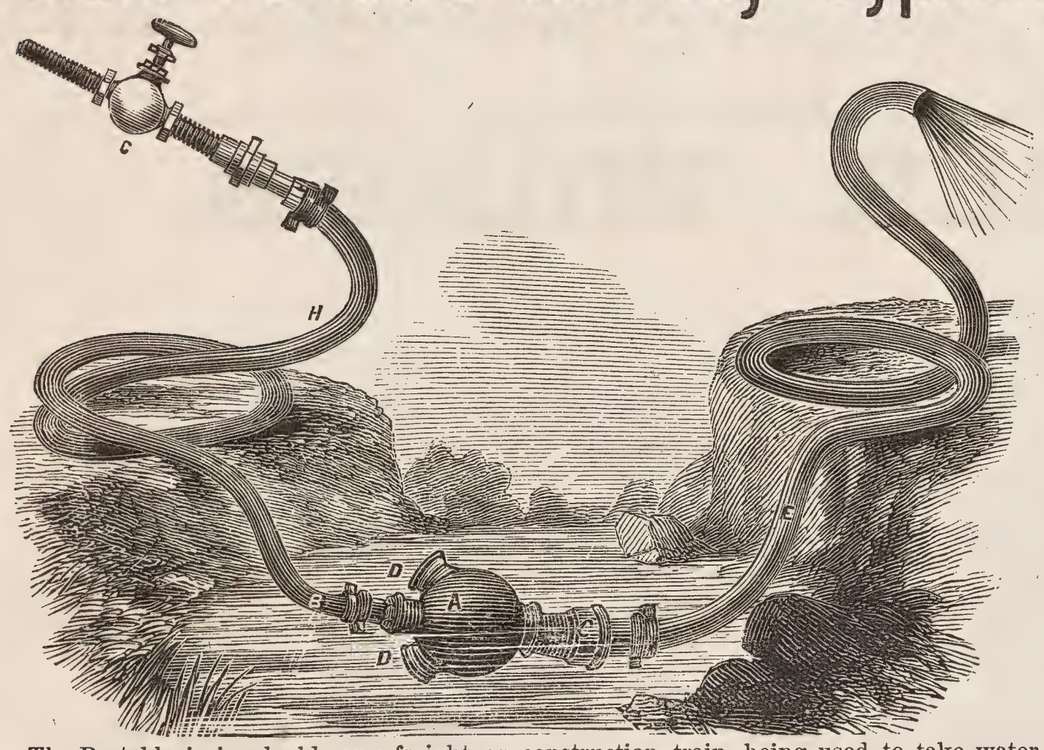


CAN NOT **FREEZE** IN ANY **CLIMATE,** UNDER ANY CIRCUMSTANCES.

Costs Less THAN ONE HALF THE PRICE OF A **Frost Proof TANK.**

The Engineer in charge of the Locomotive attaches the Hose A to a steam valve in the boiler. Steam passed through the pipe D and slip joint F into the globe H, producing a vacuum; the water is then lifted through the pipes I I and forced through the column E and hose C into the tender, filling any ordinary tender in about three minutes. When steam is shut off all the water in the pipes returns into the well, and any condensed steam passes off through the drip valve G, leaving nothing to freeze. The handle B serves to turn the discharge pipe and hose in any direction. The water delivered into the tender is warm, thus utilizing the steam used. The discharge tubes, represented above made of hose, can be made of iron if preferred.

LANSDELL'S
Patent Portable Railway Syphon.



The Portable is invaluable on a freight or construction train, being used to take water at points where there are no water stations. With it water can by taken from any point within one hundred feet of the track where there is water six inches or more in depth. The valve C is tapped into the locomotive boiler; steam is let on through the hose B; water is drawn through the orifices D D, and forced through the hose E into the tender, filling any tender with warm water in from six to twelve minutes.

Lansdell's Patent Steam Syphons, Double Suction, adopted by the United States Board of Supervisors, and approved by the Secretary of the Treasury for use on Steamboats.

For Price and particulars, applv to the General Agents of the STEAM WATER STATION COMPANY,

LENG & OGDEN,

IRON AND STEEL DEALERS AND IMPORTERS,

4 FLETCHER STREET, NEW-YORK,

Sole Agents for Credenda Steel Gun Barrels and Moulds, and the Cold Drawn Patent Weldless Steel Tubes.

Noyes' Patent Liquid Packing

FOR COOLING

Railroad Car Journals and Bearings of all kinds.

The attention of Railroad men, as well as all others who are running heavy journals is respectfully invited to the above Liquid Cooler. It has been successfully introduced on several Railroads, and is constantly growing in favor as its merits become known, and we are confident that practical men can not fail of being convinced that our preparation deserves their candid attention. What we claim for it is:

That it will cool a journal while a car is in motion, and that its use will in a great measure prevent its occurrence, saving expense, delays, and accidents; that mixed with mineral oil it gives a soft heavy body, essential elements which this oil lacks, especially in warm weather, besides keeping it sweet and preventing oxydation; that a journal will wear longer and with less friction, and be better and more thoroughly oiled; that the heat from the journal is thrown off at a temperature below that required to melt the babbitt, saving it from being destroyed, and preventing an accumulation of heat; that there is less liability of waste packing of journal getting on fire, as the non-inflammable elements of the Liquid permeates the waste and prevents it; that it will cause a considerable saving in the expense of oiling, as it imparts additional lubricating qualities, as well as body which prevents waste from running off, keeps the journal smooth and polished, and hardens the bearings; that a trial will satisfactorily demonstrate its superiority to sperm or lard oil, and that used according to directions it is even cheaper than mineral oil, which is the lowest-priced lubricating oil in the market.

We do not claim the Liquid Packing as a *durable* lubricator of itself alone, but when used with good mineral oil according to directions, we do claim that it constitutes a cheaper, better, and more durable lubricator than any thing offered for the purpose under whatever name.

One thorough application of the Liquid on a hot journal will do more execution in cooling, than the constant application of water for half an hour, besides doing it evenly and without loss of time.

DIRECTIONS FOR USING.

FOR COOLING OFF A HOT JOURNAL WHEN CARS ARE IN MOTION.—For this purpose procure a can holding two gallons, the nozzle having an outlet of not less than half an inch, and always keep it well filled with the Liquid Packing for immediate use. When a hot journal is discovered, apply the Liquid slowly, first giving the contents of the can a thorough shaking, and then proceed. Examine journal at next station, and if not cooled down to a proper temperature, apply again, and so on until it is accomplished, then fill up the box with native lubricating oil; this is particularly necessary in all cases where animal oil is used as a lubricant. In all ordinary cases this treatment will effectually cool off a journal in a short time, and without causing scarcely any delay of train. *Where a box is on fire*, pour on the Liquid which will extinguish the fire immediately. In extreme cases, where the babbitt metal has melted, or where journals are extremely rough, the journal may become hot again. If so, repeat application of Liquid as directed, and then fill up box with native oil, and so on as often as may be necessary to the end of route. A can of the Liquid Packing, together with a can of native oil, will insure the safe delivery of cars troubled with hot journals, with scarcely any delay. A smoky and hazy emanation from boxes in which the Liquid is used, simply indicates a rough journal, and that the heat is being conveyed away from it. In such cases look to it occasionally, and keep it well supplied with the Liquid. Should the Liquid become too thick to run freely from the nozzle of can, from the action of the weather, thin to the required consistency with mineral oil.

FOR A GENERAL LUBRICATOR.—Add one part of Liquid Packing to two parts of native West-Virginia or paraffine oil, and use in regular way. Or, if preferred instead, use the Liquid Packing in every third or fourth oiling, according to the temperature of the weather and quality of oil. Used in this way, aside from its cooling qualities, it makes a lubricator that can not be excelled in price and quality.

WHAT RAILROAD MEN SAY OF IT.

MR. NOYES: FITCHBURG, MASS., Aug. 20, 1872.

Dear Sir: I have used your Liquid Packing for the past four months, and am perfectly well satisfied that it is the most effectual article ever in use for the purpose claimed. I have just ordered another barrel. If all railroad companies would adopt yonr Liquid Cooler, I think they would find a saving of nearly 20 per cent. when used with mineral or black oil according to your directions, JACOB MARSH, *Master Car-Builder Troy and Greenfield R. R.*

MR. P. NOYES: SALEM, MASS., Aug. 7, 1872.

Dear Sir: I have been using your Liquid Packing for cooling car journals, for some time past, and have been well pleased with it. I have had occasion to use it a number of times, under Pullman Cars, and it has been a complete remedy in every case of hot journals.

Every train should be provided with it, as it is a saving of time and expense in the running of trains, provided it is applied and cared for according to directions for using.

J. P. SOMERBY, *M. C. B. of Eastern Railroad.*

MR. P. NOYES, Agent: WORCESTER, MASS., July 11, 1872.

Dear Sir: Please send us another barrel of your Liquid Cooler. Have been experimenting with it for the past six months, and find it all you recommend. It can not fail of accomplishing the work, and with it and a can of native oil, can deliver my cars any where in good condition. I find, however, as you stated, that it will not work with amimal oil, but with mineral oil, and when used according to your directions it works entirely satisfactory. I shall take especial pains to pass its merits along. OSGOOD BRADLEY, *Car Manufacturer.*

OFFICE OF NORTHERN RAILROAD,
MR. NOYES: CONCORD, N. H., May 26, 1872.

Dear Sir: Send to this corporation a barrel of your Liquid Packing. The sample package cooled four hot boxes within a distance of eight miles. I shall have a can on board each train, for it gives perfect satisfaction. A. LANGMAID.

P. NOYES, Esq.: ALBANY, Nov. 1, 1872.

Dear Sir: I received the barrel of Liquid Packing you sent me for trial, and gave it out to our most experienced conductors to use according to directions. Below please find their report:

We, the undersigned, Freight Conductors on the Eastern Division of the N. Y. C. & H. R. R.R., have used the Liquid Packing furnished by Mr. Jones, and find that when we arrive at a station with a hot journal, the Liquid Packing cools it sufficiently by the time we arrive at the next station to use the Black Oil, and then have no trouble in getting through with it. It is the best we ever used. R. H. FISHER, A. W. GETMANS, R. H. HEATH, WM. HESS, Conductors E. DIV. N. Y. C. R. R.; I. FERGUSON, Conductor H. R. R.R.

JOSEPH JONES, *M. M. N. Y. C. & H. R. R. R., E. Div.*

NEW-YORK, PROVIDENCE, AND BOSTON R. R. Co.,
BELT AND LEATHER STUFFING CO.: PROVIDENCE, Aug. 3, 1870.

Gentlemen: Some two months since I received from you a can (1½ galls.) of your Liquid Packing for cooling Journal Bearings on cars; I had just repaired and put to running an engine; the first trip the truck boxes (all new) heated badly. I gave the Liquid Packing to the engineer and instructed him to use it according to directions. The consequence was that we had no more hot truck boxes. I was so well satisfied with it that I ordered a barrel, and for the past month, when we have a hot box on any of our cars, we apply at once your Liquid Packing, which has in all cases, thus far, cooled the journal so as to give no further trouble or delay. During the past two weeks we have received from the Taunton Car Co. four new passenger cars; the two first when received by us from Taunton had each journal VERY HOT, with the babbitt metal melted out of brass shells, I renewed the metals and packed them with your Liquid Packing. The cars have been running 150 miles each day ever since, WITH NO MORE HOT BOXES. Some ten days since we received from the N. L. & N. H. R. R., at the Ferry Boat at Groton, (through express train from New-York to Boston, shore line,) a car having a red-hot box; your Packing was at once applied, cooling the journal so that the men were able in a few moments to put in a new metal; they then repacked with your Liquid Packing, according to your printed directions, and the car came into Providence, a distance of sixty-three miles, perfectly cool, without any further trouble. If it continues to work as well, I can not do without it. I cheerfully recommend it to all Railroads, as being an article which they will find invaluable in all cases of hot journals.

J. H. ANDERSON, *Master Mechanic.*

Send for a barrel. No charge unless it does all we state.

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Also BELT DRESSING for preserving belts, and preventing them from slipping, and CABINET OIL Tanks for storing, drawing, and measuring oil, of all sizes.

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Narrow Gauge Locomotives a Specialty.

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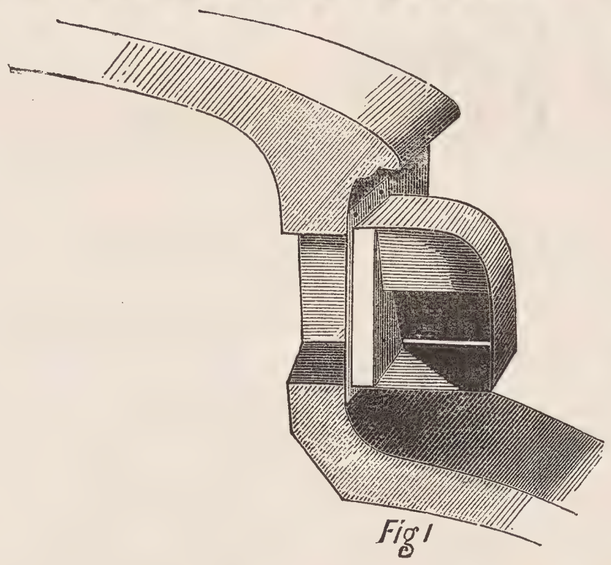


Fig 1

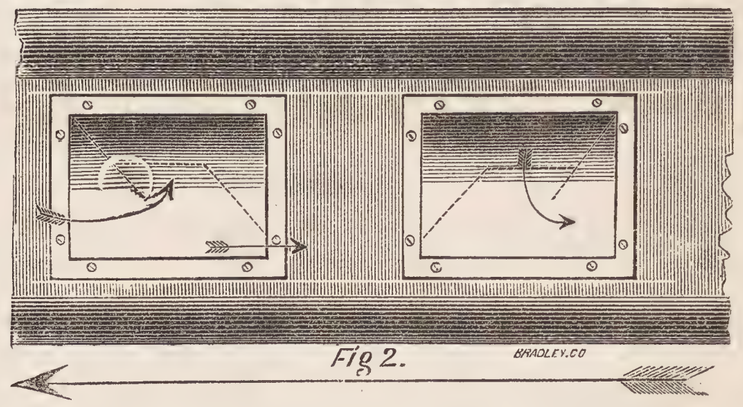


Fig 2.

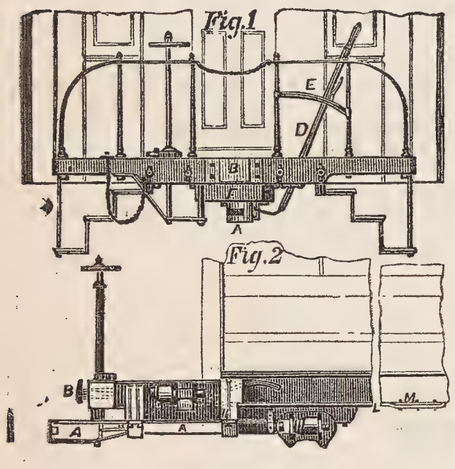
The Ventilators are placed as usual in the car roof as shown in Fig. 1, their mouths facing alternately in opposite directions, those facing forward admitting the air, and those facing backward affording an exit. Fig. 2 represents a side section of the raised roof with two of the ventilators alternately arranged. When the car is moving in the direction indicated by the arrow, it will be seen, by the curved darts, that there is an ingress and egress of air constantly taking place. The operation of the ventilators is reversed with precisely the same effect, when the car moves in the opposite direction. The internal structure is such that the dust and cinders passing into the mouth of the ventilator are intercepted by striking against two shields, shown in Fig. 1, and indicated by dotted lines in Fig. 2, and are thus naturally thrown to the bottom, where they are carried out through a small opening as shown in Fig. 1, and by the straight dart in Fig. 2, a current of pure air being forced into the car at the same time through a lateral opening. The faster the car moves, the greater is the quantity of air admitted and expelled, thus securing a free circulation which does not subject the occupants to a direct current or draught. The ventilator is also noiseless in its operation. There is no clattering of valves, and no change is necessary when the car reaches its destination. Once put in place, it is always in readiness, and runs itself independent of all employees.

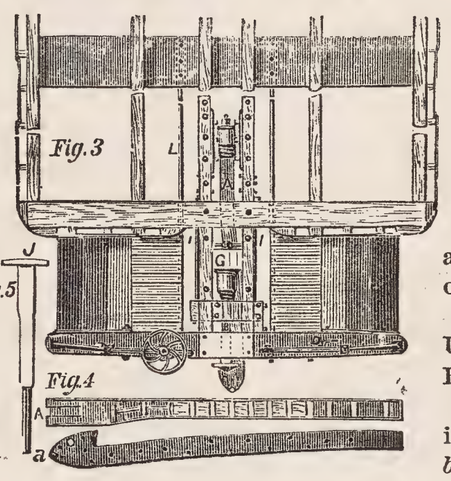
H. D. CARROLL & CO., Springfield, Mass.,

Proprietors and Manufacturers.

ROBERT HITCHCOCK, Inventor.

MILLER'S TRUSSED PLATFORMS. Compression Buffers and Automatic Couplers for Railroad Passenger Cars.





Office, 231 Broadway, (Rooms 4 and 5,) New-York.

Send for Illustrated Pamphlet, and call and see working models. E. MILLER, Patentee

DESCRIPTION.

Figure 1 is an elevation; Figure 2, a longitudinal section; Figure 3, a plan of an end of a car to which the arrangement has been applied: and Figures 4 and 5 show top and side views of the "Hook" and "Buffer," drawn on a larger scale than that of Figures 1, 2, and 3.

The letters refer to the same parts in all the figures. A is the coupling "Hook," B the "Buffer," C the "Stop," D the "Lever," E the "Quadrant Ratchet," F the "Truss Beam," G the "Spring Beam," H the "Suspender Beam," I the "Upward Trusses," K the "Main Spring," L the "Downward Trusses," and M the "Bolster."

The Platforms, instead of being located below the centre line of the main sills of the cars, are placed *in* that ine, and held there by the Trusses I and L, so that the point of contact (in Buffers B) is *in* the said centre line and *not below* it.

The coupling "Hook" A is attached to the draw spring the same as the ordinary draw head, and at the same height above the track, but in such a manner that the outer end is free to move laterally for a short distance. The Coupling Hook projects beyond the platform. The Stop C is placed under the Buffer Beam to prevent accidental uncoupling. When two cars are brought together, the Coupling Hooks, from *their shape*, push each other aside, until the Buffers B are compressed hard on the Buffer Springs, then—*the points of the hooks having passed each other sufficiently far*—the Hooks are carried forward by their main-springs, and thus the "*Coupling*" and "*Compression*" are both effected automatically *and at the same time*, and without the use of links and pins. When two cars are thus coupled together, the *head* of the *Hook* of each car is under the Buffer Beam of its opposite car, and the platforms are close together, (about 4 inches apart.) The effect of this is, *one platform can not be forced over the other*, nor can a *child* fall between the platforms; the dust and rain are nearly all shut out; the "Compression" makes the train run steadily, and prevents all jerking at starting and stopping.

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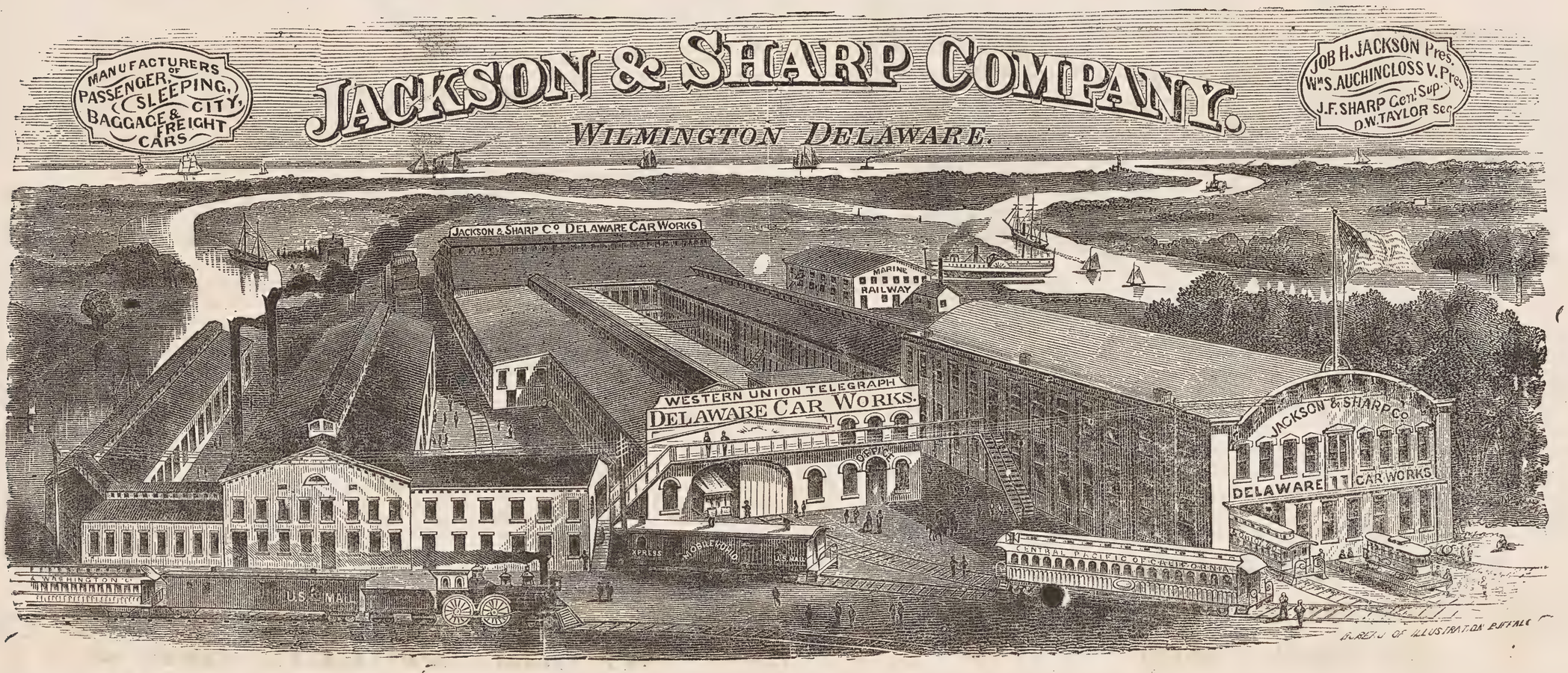

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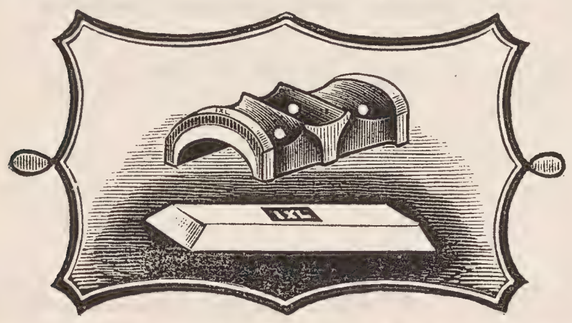
WILLIAM M. HOES, Secretary,
287 Broadway, Room 7.

ORGANIZED MAY 1869.



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For Scouring and Polishing any kind of Metal, this TRIPOLI works more rapidly, and gives a finer surface than Flour of Emery.

For Scouring, use with oil, after which, use dry for Polishing.

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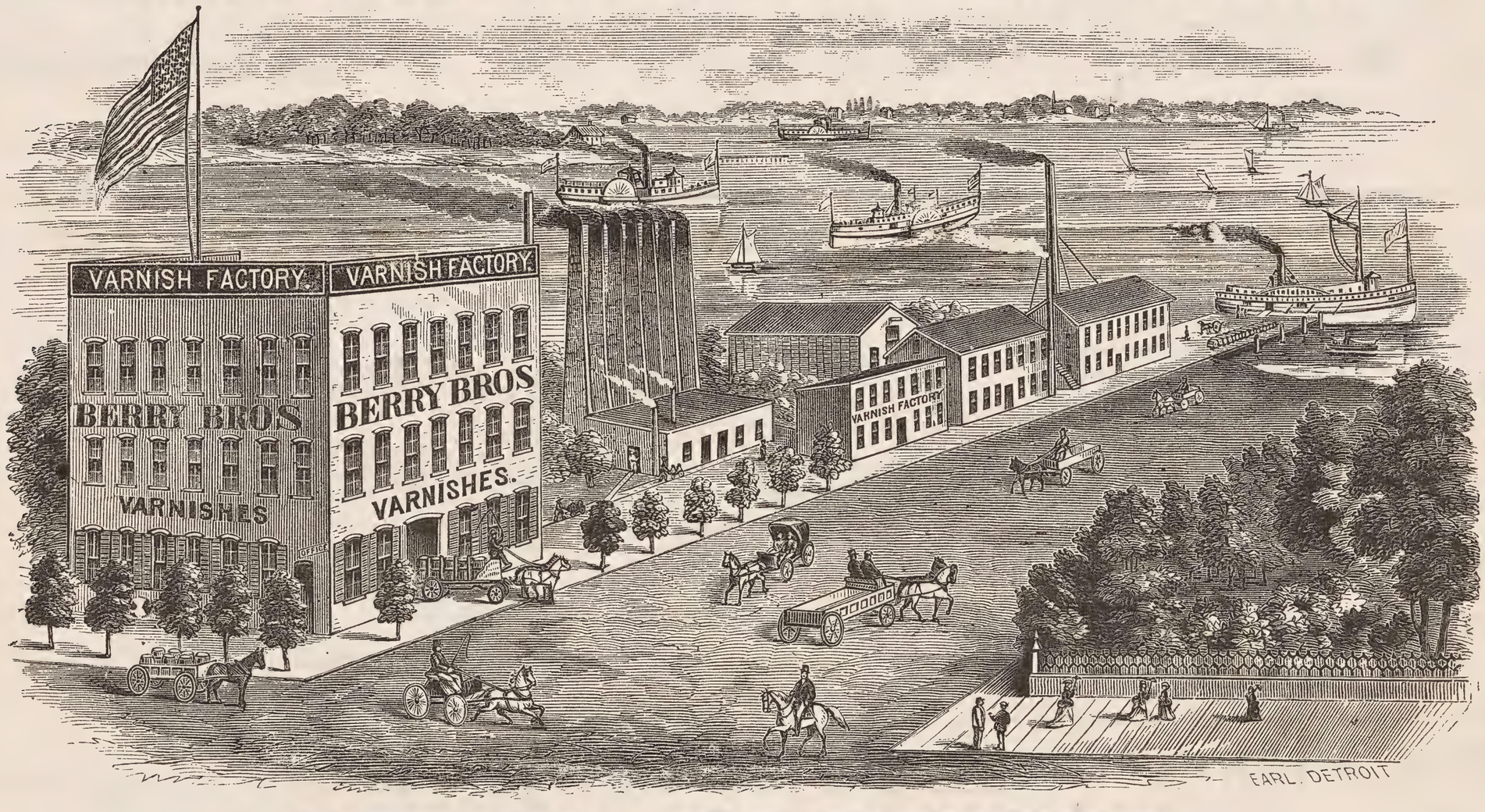

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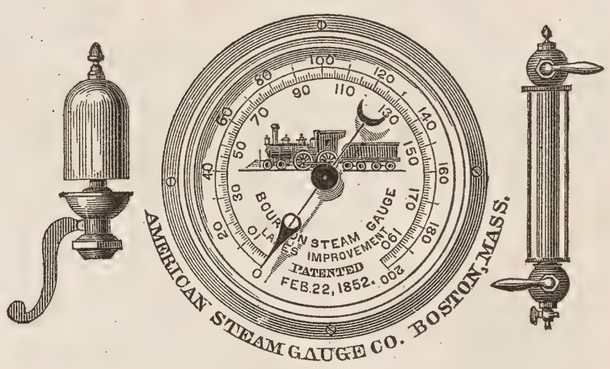

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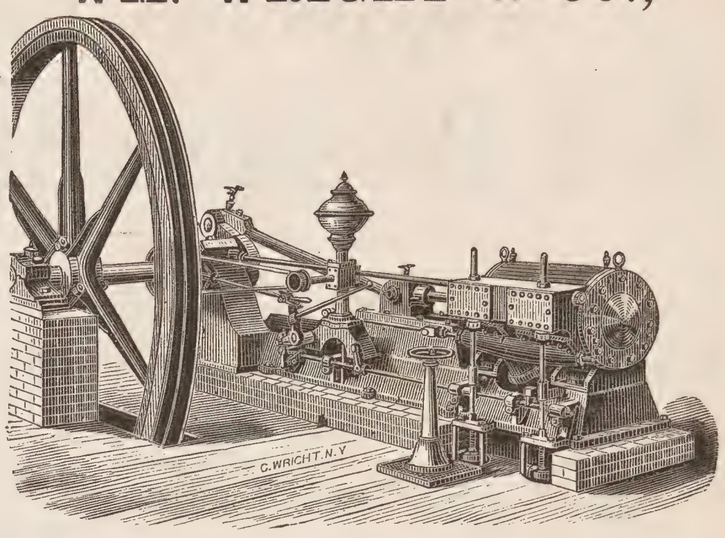

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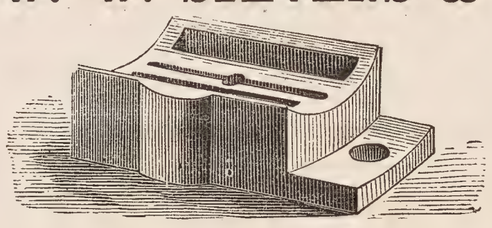

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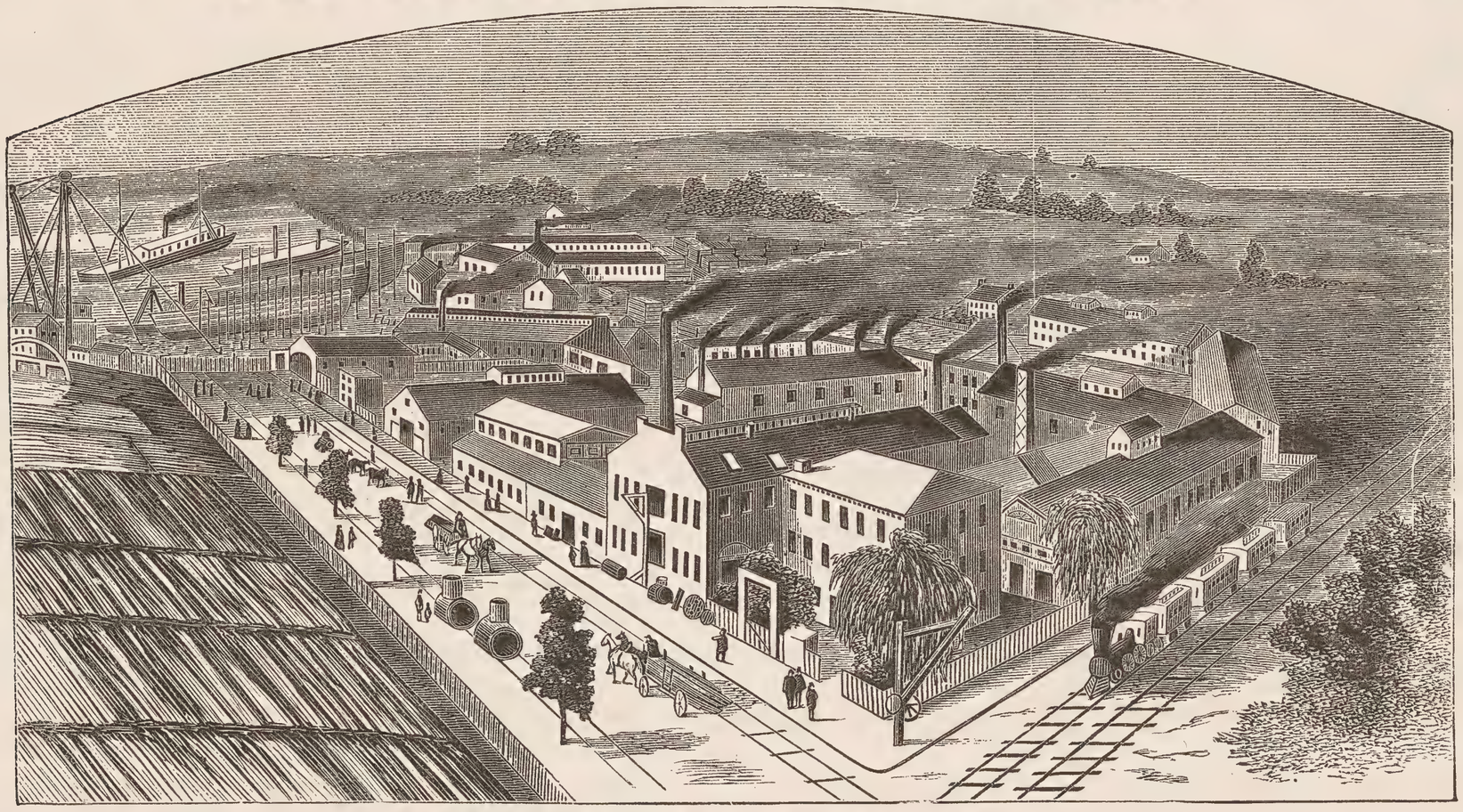

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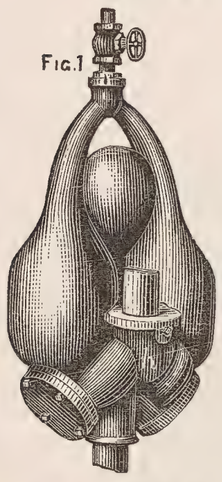

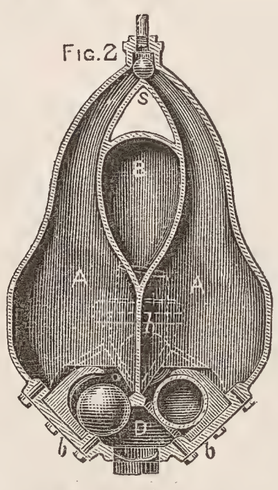

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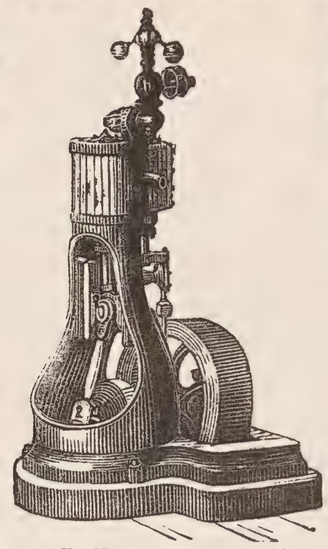

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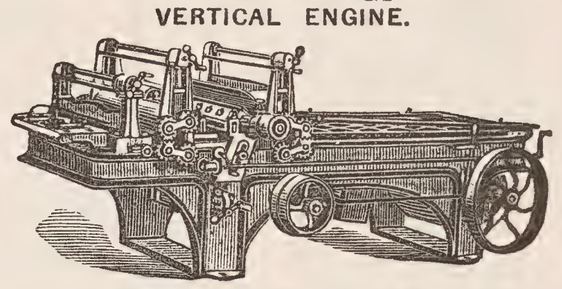
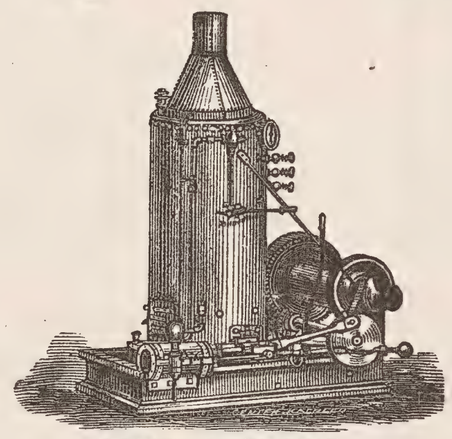


WOODWORTH PLANER.



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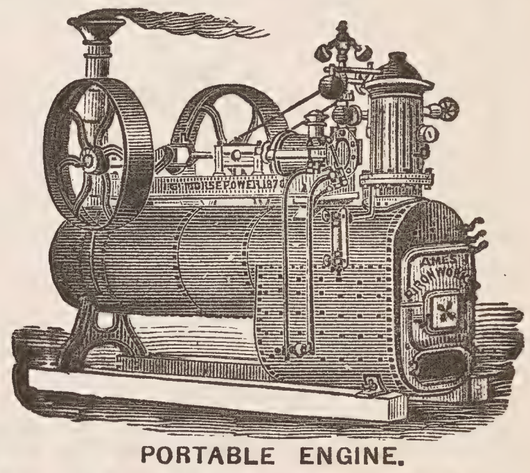

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Vol. IV.
No. 8.

AUGUST, 1873.

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Railroad Statistics.

We copy the following interesting statistics from Poor's Manual for the current year, which has just been published:

Tabular Statement showing the number of miles of railroad in the United States since 1830, *and the number of miles constructed each year since that date:*

Year.	Miles in Operation.	Annual increase of Mileage.	Year.	Miles in Operation.	Annual increase of Mileage.
1830	23	..	1852	12,908	1,926
1831	95	72	1853	15,360	2,452
1832	229	134	1854	16,720	1,360
1833	380	151	1855	18,374	1,654
1834	633	253	1856	22,017	3,643
1835	1.098	465	1857	24,503	2,486
1836	1,273	175	1858	26,968	2,465
1837	1.497	224	1859	28,789	1,821
1838	1,913	416	1860	30,635	1,846
1839	2,302	389	1861	31,286	651
1840	2,818	516	1862	32,120	864
1841	3,535	717	1863	33,170	1,050
1842	4,026	491	1864	33,908	738
1843	4,185	159	1865	35.085	1,177
1844	4,777	192	1866	36,827	1,742
1845	4,633	256	1867	39.276	2,449
1846	4,930	297	1868	42,255	2,979
1847	5,598	668	1869	47,373	5,118
1848	5,996	398	1870	52,898	5,525
1849	7,365	1,369	1871	60,677	7,779
1850	9,021	1,656	1872	67,104	6,427
1851	10,982	1,961			

The total cost of the railroads, the operations of which are given for the past year, as shown by the preceding table, is $3,159,423,057, made up of $1,647,844,113 of capital stock, and $1,511,578,944 of various forms of indebtedness, chiefly of bonds maturing at distant periods. The capital stock amounted to 52.15 per cent, and the debt to 47.85 per cent of the total cost. The cost of these roads per mile was $55,116. The gross earnings for the year were $473,241,055, of which $132,309,270, or 28 per cent, was received for transportation of passengers, and $340,931,785, or 72 per cent, for the transportation of freight, including under this head the small amount received from "miscellaneous sources." The receipts per mile were $8256. The ratio of earnings to population was $11.76 per head. The operating expenses for the year were $307,486,682, or 65 per cent of the gross receipts, leaving $165,754,373, or 35 per cent, as net earnings. The percentage of gross receipts to the total cost of the roads was 15 per cent; of net earnings 5.2 per cent. The amount paid in dividends was $64,418,151, or 3.91 per cent of the aggregate capital stock. The balance of net earnings, $101,336,222, was equal to 6.70 per cent on the aggregate indebtedness of the roads.

The earnings of the railroads of the several sections differed, of course, very greatly, the most productive lines being those embraced in the groups which include the New-England and the Middle States. The railroads of New-England earned, during the past year, $48,519,835—being $10,636 per mile, and $13.53 per head of population. Their total cost was $230,609,794, of which 55.94 per cent was represented by capital stock. Their cost per mile was $50,418. Their gross earnings were 21.1 per cent of their cost. Their net earnings $14,436,481, and at the rate of 6.26 per cent of their total cost. The dividends paid amounted to $8,569,877, or 6.64 per cent on the aggregate capital stock of $129,012,748.

The cost of the railroads of the Middle States was $922,700,774, or $79,427 per mile, of which 60.56 per cent was represented by capital stock. Their earnings were $169,205,702, or $14,565 per mile and $15.86 per head of population. The net earnings were $59,527,048. The gross receipts were 18.3 per cent of the total cost; the net earnings 6.4 per cent. The amount paid in dividends was $32,344,971, or 5.79 per cent of the capital stock of $558,838,174. In the State of New-York, however, the capital accounts of the New-York Central and the Erie railroads include $101,498,248 of fictitious capital, of which $54,436,626 was issued by the former as the estimated value of its property above cost, and $47,061,622 by the latter as the discount on bonds converted into stock. These sums, deducted from the capital stock of the railroads of the State, reduced the amount in that group to $457,339,926, and the cost of the roads to $821,202,526. The percentage of gross earnings on this sum was 20.6, and of net earnings 7.25; and the dividends paid were 7.09 per cent of the actual capital stock of the roads.

The total mileage of the railroads of the Western States, the operations of which are given, was 28,778—built at a cost of $1,472,625,232—made up of $724,686,046, or 40.21 per cent of capital stock, and $747,939,186 of debt. The cost per mile was $50,550, against $50,418 for New-England and $79,427 for the Middle States. The gross earnings were $193,826,252, being $13.76 per head of population. Net earnings, $67,317,083. The ratio of gross receipts to cost was 13.1 per cent, against 21.1 in New-England and (with the reduced capital) 20.6 per cent in the Middle States. The ratio of net earnings to cost was 4.57 per cent. against 6.26 for New-England, and 7.24 for the Middle States. The number of inhabitants per mile of road in the Western States is 433; in the New-England and Middle States, 770. The receipts per mile in the Western States were $6735 against $10,636 in New-England, and $14,565 in the Middle States. The dividends were $20,496,447, being 2.83 per cent on the capital stock.

These statements disclose, at a glance, the position of the Western railroads. Their unproductiveness, compared with those of the Eastern States, is due simply to the excess of mileage to population. The earnings per head are nearly as great in the former as in the latter. Should no more railroads be constructed in the Western States for six or seven years, this disparity would be corrected by the rapid increase of their population, which may be estimated at 600,000 annually. The increase of earnings from such increase of population would fully equal $8,000,000 annually, which, together with the increase of receipts from the permanent population, estimated at one dollar per head, annually, would, were no new lines set in operation, soon bring up the receipts per mile and per cost of the Western railroads to the standard of the New-England and Middle States.

In the Southern States, the total mileage, of which operations are given, was 10,986. The cost of the railroads was $401,913,267—or $36,575 per mile—being less than one half the cost per mile of those of the Middle States, and 70 per cent of the cost per mile of those of the New-England and Western States. The capital stock was $171,683,155, or 42.71 per cent of total cost, and the debt, $230,230,112. The gross earnings were $47,788,539—being $4350 per mile—against $10,636 for New-England, $14,565 for the Middle, and $6735 for the Western States. The net earnings were $16,455,490. The earnings per head were $4.31. The ratio of gross receipts to cost was 11.88 per cent; of net earnings, 4.09 per cent. The dividends paid amounted to $3,006,856—being 1.5 per cent of the capital stock.

In the Pacific States, with a mileage of only 1368, the cost has been $131,573,990—or $98,300 per mile—represented by $63,623,990, or 49.11 per cent of capital stock, and 50.89 per cent of indebtedness. The gross receipts were $13,900,727, or 10.5 of the cost, and the net earnings, $8,018,271, or 57.7 per cent of the gross earnings and 6 per cent of the total cost. The earnings per mile were $10,161; per head of population, $17.

The Philadelphia and Reading Railroad Car-Shops.

We copy from the *Railroad Gazette* the following notice of the car-shops of this road, at Reading, Pa.:

These are under the charge of Mr. Aaron Steinbach, and are all inclosed under one roof and included in one building, which is 700 feet long by 165 wide. The roof is in three spans of 55 feet each, supported by two rows of iron pillars, which divide the shops into three divisions. In the centre one, and extending the whole length of the shop, is a transfer table, and on each side are tracks running transversely to the length of the shop. The cars are carried to and from the tracks by the transfer table, which runs on a track level with the floor, and not sunk down in a pit as is usually the case with similar structures. The side-tracks are elevated on timbers about 10 inches square, which, it is said, give sufficient elevation to allow room for working below, and leave the floor flush with the bottom of what usually is the "pit" for the transfer table, but which in this case is the floor of the shop, which is covered with asphalt.

With the immense coal traffic of this road, the repair and construction of coal cars of course forms a large or perhaps the largest part of the work of these shops. The cars used consist of three classes, four-wheeled iron cars, four-wheeled wooden cars, and eight-wheeled wooden cars. The first weigh about 5600 pounds and carry five tons (11,200 pounds) of coal. The second weigh 5376 pounds and carry the same quantity of coal as the first. The eight-wheeled cars weigh six tons and carry ten tons of coal.

The experience with axles on this road is worthy of note. The first journals were made 2¼ inches in diameter by 5½ long, of which there are still a number running. They were next enlarged to 2½ by 6½, then to 3¼ by 8, and finally to 3⅞ by 8. The latter are used, however, on the passenger cars and tenders only. Mr. Steinbach informed us that he had never seen an 8-inch journal cut, although they had been in use since 1868 or '69. The large passenger-car journal is somewhat peculiar. Instead of having a collar at the outer end, as is customary, there is a groove turned in the centre 1⅞ inches wide and ⅝ deep. A corresponding projection on the brass fits into this groove, which thus answers the same purpose as the ordinary collar. The experience of this company is strong testimony in confirmation of the wisdom of the Car-Builders' Association in adopting a large size for the standard car-axle.

On a road doing the business which the Reading Company does, there is, notwithstanding the fact that the bulk of its traffic is coal, a very considerable passenger and other equipment required. Mr. Steinbach has, therefore, orders which he is now executing, for 500 "gondola" cars, 225 box-cars, 25 stock-cars, 58 lime-cars, 12 passenger-cars, and 25 new tenders.

It is quite curious to note the influence which some apparently very simple causes will have, and how very far-reaching they are in their ultimate results. When the Reading road was built, the tunnels, cuts, and bridges were made so narrow that it became dangerous for passengers to put their heads or their arms out of the windows. To protect them from accident, it therefore became necessary to inclose the windows with iron gratings. It was, therefore, impossible for passengers to escape from the cars through the windows in case of accident, and consequently fire would be very disastrous in such cases. To guard against this danger, Mr. Wooten—formerly Engineer of Machinery and now the General Superintendent—devised a hot-air furnace, which is suspended below the car. Cold air is admitted into this by suitable dampers, and after being warmed is distributed through the car by a flue extending its whole length immediately under the windows and next the floor. There are also branches from this under each seat. The smoke from the fire is carried from the furnace to the end of the car, and escapes through a vertical pipe located in the corner. This plan has been in use for several years, and we were told works very satisfactorily, although it doubtless requires more intelligent attention than an ordinary stove. Besides being a protection from the danger of fire, it leaves room for at least four seats, which must be removed if the common stoves are used. It also has the merit of being a ventilator as well as a heater—in fact, it is impossible to warm a car with it without at the same time ventilating it, which is the only way to insure thorough ventilation in cars in winter.

As the grated windows also made it dangerous to use lamps or candles in these cars, as well as stoves, it was necessary to provide means for lighting them without incurring the risk of fire from this source. Gas has therefore been introduced into most of the cars of this road. The supply is stored in a cylindrical iron reservoir, 12 inches diameter by 6 feet long, suspended under the cars near the furnace. These are so arranged that they can easily be removed and charged with gas, which is forced into them by stationary pumps. A supply of these reservoirs is kept on hand ready charged, so that when a train comes in, those which are exhausted are removed from the cars and full ones substituted. There is of course a varying pressure in the reservoirs, diminishing as the gas is burned. The supply of the burners is, however, regulated by a cock, which is opened wider as the pressure is reduced.

The passenger cars have four-wheeled trucks. The most noticeable feature about their design is the springs, which are of the half elliptic pattern, 51 inches long, with 10 plates ⅝ inches thick by 4 inches wide. The brakes are hung between the wheels. The car-seat used on this road is also noticeable, as the frame is made of angle iron, bent to the required shape. It is doubtless much lighter, and to our taste much neater than many of the cast-iron seat-frames now in use.

Mr. Steinbach, in some of his new cars, has used the end ventilators which Mr. Garey, we believe, was the first to apply to the raised roof.

The general finish of the passenger cars of this road is very plain, but we think, for that reason, in much better taste than much of the gaudy ornament now so commsnly used. This is especially noticeable in the head-linings, which are painted in subdued gray, purple, blue, buff, and other comparatively neutral tints. The effect is very pleasing, and has none of that *riotous* appearance which some of the intemperately brilliant crimson and gold-colored cars have.

The store-room of the car-shops is situated near the middle of the large building. Here nearly all the castings and forgings used in the construction and repair of cars are stored, and are distributed to the proper parties for use. An accurate account is kept of all that is used. This is done by the person in charge of the room, who is supplied with a large blackboard ruled off in a sort of tabular form. In the right-hand column are painted the names of the cars to which the material is to be charged, and at the top are the names of the parts which are kept in store. This makes it very easy to charge the material to the proper account, which is done with a piece of chalk, and the amounts are each day copied into the permanent books.

The paint shop is located about half a mile from the main shops in an old building which was formerly used for a freight-house. About 600 men are employed in the car department.

The Locomotive Engine Considered as a Chemical Laboratory.

BY J. M. BLANCHARD.

THE locomotive, in whatever aspect it presents itself to the mind, is a thing of absorbing interest to thoughtful persons, and especially is this the case when it is considered as a laboratory, in which different chemical operations are being carried on at one and the same time.

It is probably not too much to say that the chemistry of the steam-engine has been less studied than any other of its essential features, and that there is a correspondingly less degree of positive knowledge existing in the public mind in regard to it. In treating the subject as it pertains more especially to the locomotive engine, it will be divided into two parts; first, the chemistry of the furnace or fire-box; and secondly, that of the interior or water space of the generator; and as coal is fast becoming the standard fuel, it will be taken as the fuel used in the matters described in this article.

The chemistry of burning coal is of a complex character, because it involves a chemical change in the air which is necessary for its combustion, as well as in the coal itself, and hence it is proper to speak first of the changes produced in the air, which may fairly be considered chemical.

The component parts of atmospheric air being oxygen and nitrogen, in the proportion of one pound of the former to three and one half of the latter; or by volume, one cubic foot of oxygen to four cubic feet of nitrogen—the last-named being neutralized in combustion—it follows that the chemical action produced in consuming five cubic feet of air, is to convert it into two separate and distinct gases, oxygen and nitrogen, and in the proportion of one of oxygen to four of nitrogen; and this separation is as absolute and certain as if made in the laboratory of the chemist.

Coal consisting of volatile or gaseous, and fixed or solid substances, of which the volatile or gaseous are hydrogen, five pounds; carbon, twenty pounds; and the fixed or solid carbon, sixty pounds, and the non-combustible fifteen pounds, in one hundred, it will be seen that the chemical operation or function of the furnace of a steam-engine is to separate or convert each one hundred pounds of coal consumed therein, into five pounds of hydrogen, and twenty of volatile or gaseous carbon, and sixty pounds of fixed carbon, leaving fifteen pounds of non-combustible material for a given quantity of coal.

These two chemical operations, while separate and distinct from each other, in so far as relates to the separation of their constituent parts, are nevertheless dependent upon each other for their final result, and for this upon the combustion of their parts; for it must be remembered that heat is the solvent which alone can produce the changes alluded to in a manner to make them available in the steam-engine, and this can only be effected properly when the gases caused by the chemical action of the heat upon air, and those resulting from the burning fuel, are carefully combined; and as the proportions of material thus combined in any chemical experiment are of the first importance to the production of a given result, so in the perfect combustion of coal in generating steam, the quantity of air admitted to the furnace with reference to the amount of coal placed in it, and to the rate of combustion, is also of prime importance in the production of the best possible results.

It will be found that for the perfect combustion of the five pounds of hydrogen contained in one hundred pounds of coal, there will be required 2500 cubic feet of air; for the twenty pounds of carbon which has assumed the gaseous or volatile form, 3200; and for the fixed or solid carbon, 9600 feet.

These amounts being the theoretical ones, they should be increased in the aggregate, say 5000 feet, in order that an abundant supply of air may be had at all times, should it become necessary to increase the rate of combustion, a circumstance which often occurs in the use of the locomotive.

While the coal upon the grate is incandescent, and is having the amounts of air above stated passed through it, there is a very important chemical combination occurring in the furnace, where each pound of the hydrogen of the coal which has been set free by the heat, requires eight pounds of the oxygen which has been liberated from the nitrogen with which it was previously united, in order that perfect combustion may ensue.

Measuring the last-named gases by volume, each cubic foot of hydrogen would require just one-half of a cubic foot of oxygen, the product of which would be steam, aqueous vapor, or water.

It being a fact that oxygen is sixteen times as heavy as hydrogen, it follows that the latter will combine with eight times its weight of oxygen, which will be only half the volume of the hydrogen; or, in other words, the volume of one pound of hydrogen, which is 200 cubic feet, at the temperature of 62° Fahrenheit, will combine with 100 feet of oxygen in the production of perfect combustion.

By the term "perfect combustion" in this article is meant the burning of coal in such a way as to produce carbonic acid, as contradistinguished from the production of carbonic oxide, which latter, as is well known, is capable of a further combustion, and which, if allowed to escape while in that form, is productive of great loss.

Each pound of pure carbon requires for its perfect combustion two and two thirds pounds, or thirty-two feet of oxygen, which will form carbonic acid; but a slow and unprofitable combustion may be maintained by the union of one and one third pounds, or, say twelve cubic feet of oxygen, the result of which will be carbonic oxide.

From what has been said, it will be seen that for every foot of oxygen required to produce perfect combustion, five cubic feet of atmospheric air must be admitted to the furnace; and that to admit it in much larger quantities would be injurious, because it would then become a vehicle or means of carrying off a portion of the heat generated by the union of the proper quantity with the fuel, the chemistry of the furnace being so perfect that there would be no hydrogen or carbon left to need the assistance of the additional amount of oxygen.

While the operations above described are being carried on in the furnace of an engine, there is another no less important one being produced in the water-space of the generator, which contains a liquid, the component parts of which are two volumes of hydrogen and one of oxygen.

By imparting to this liquid, which is incompressible, the requisite amount of heat, it expands up to a certain point, beyond which, if further heated, it assumes the form of a gas, in which form it is capable of still further expansion, until, at a temperature of 212°, it will fill a space 1700 times as large as that occupied by it while in its liquid form at a pressure of fifteen pounds.

I am aware that the question may be raised as to whether or not the action of the heat upon the water in a steam generator is a chemical, physical, or a mechanical one; and it is proper that I should say that, strictly speaking, it cannot be regarded as chemical action in ordinary practice, for the reason that the degree of heat imparted to the steam is not sufficient to produce such action; while, then, it would be proper to speak of the chemical action of heat upon steam, it probably is not proper to speak of such action upon water in converting it into steam, or in heating such steam to its working pressure.

Waiving the technical point named, I shall proceed to treat the action of the heat upon the water as mechanical rather than chemical, premising that the action is more or less useful or interesting on that account; and further, that when we come to fully understand that in the generation of steam there is an electrical condition produced of which we as yet know but little, we may be willing to admit that it does really constitute a chemical action.

Whatever may be the action of heat upon water when carried to the extent of converting it into steam, its effect is well known, it being such as to cause a rapid motion of its particles, and then to cause them to fly apart, and this produces what is termed expansion; and by continuing this heating process to the proper point, we have steam of sufficient pressure to propel our engines.

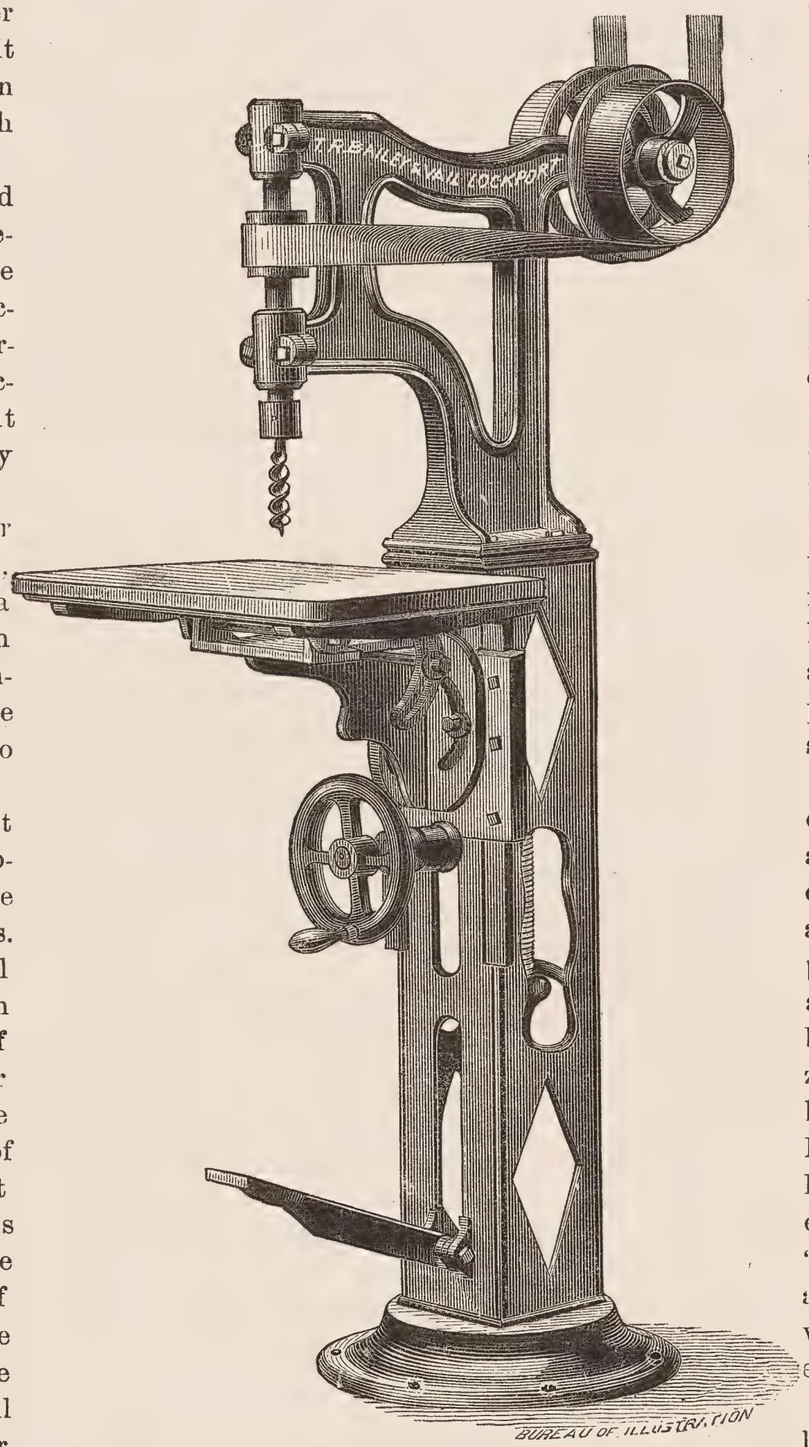
The mode or method of the operation of the heat generated, as described in the first branch of this subject, is intensely interesting to those who take the pains to examine into it and to watch it in its progress. In the first place, as is well known, it has to travel through the metal of which the generator is made, in doing which it is compelled to put all of the particles of such material in motion, they having the capacity for transmitting a given amount of heat in a given time with a given temperature. After this increment of heat has struggled through the metal as described, it meets with another obstruction in the water, which is a bad conductor, and does not readily consent to the passage of heat through it; but as it has a mode of operation peculiarly its own, it does not stop because of this obstruction, but it immediately forms a globule upon the surface of the metal, where it remains until more increments come to its assistance, which by their combined efforts force the water away from a small portion of such surface, and at once fill the globule with steam, where it remains until the pressure within it is greater than that of the other portions of the generator and of the superincumbent water, when it bursts its watery walls and rises to the surface of the water, where it appears in the form of a gas, but none the less representing the increment of heat which we found causing such commotion among the particles of metal which divided it from the water in the generator.

It would be interesting to speak of the currents of electricity evolved in the conversion of the water into steam, but the limits of this article forbid its being done here.

THE St. Charles Manufacturing Company, at St. Charles, Mo., was organized in March last with a capital of $150,000. It will manufacture railway-cars, carriages, agricultural implements, and machinery.

New and Improved Upright Boring-Machine.

THE engraving represents an improved boring-machine, manufactured by Messrs. T. R. Bailey & Vail, Lockport, N. Y. Among other advantages it is said to have over the old style of machine for this purpose, are its smaller dimensions, occupying much less room. It can also be run direct from the line-shaft, or any other shaft that may be available. The table can be tipped to bore at any angle, and also can be raised by the treadle, so as to bring the work up to the bit, instead of drawing the bit down. It can be raised or lowered at the same time by the hand-wheel, and adjusted to any required size of work, from one to six or eight inches. There are no springs or weights to perplex the operators. The motion is communicated to arbor by running the belt over the two pulleys at top and back of the machine, as shown in the cut. The bit-holder, or chuck, is self-centering, requiring no set-screw to hold the bit, which is done by simply screwing up the round nut on lower end of arbor. Counter-



shafts, when furnished, have seven pulleys, and should run 500. Speed of arbor, 2000. Weight, boxed 400 lbs. For catalogue and other particulars, address proprietors, as above.

New Woodruff Parlor and Sleeping-Coaches.

WE copy from the *Cleveland Herald* the following description of two new and improved parlor and sleeping-coaches, built by the Jackson & Sharp Company, of Wilmington, Del., under the personal supervision of Mr. Jonah Woodruff, President of the Woodruff Sleeping and Parlor-Coach Company, and designed to run between Cleveland and St. Louis.

"The two new coaches are alike in every respect, and combine all the latest improvements. In all their elegant appointments they seem to approach so near to perfection that the mind of the traveler can conceive of nothing more to be desired. The exterior colors are chocolate and maroon, ornamented in golden arabesque. At each end is a spacious rotunda, containing a marble wash-bowl, with all convenient accessories for the toilet, water fountain, closet, etc. Above is a water-tank holding twenty gallons, affording an abundant supply, so essential to the comfort of passengers. The ceiling is of papier-maché, beautifully frescoed; a handsome lamp hangs from the centre, and when isolated from the main saloon by the sliding of a door, each of these rotundas forms a luxurious, cozy apartment, suggestive of a well-ordered home.

"The main saloon is fifty-four feet in length by ten feet in width, and in describing its appearance the word 'gorgeous' might be used without being extravagant. The panels are of the finest French walnut, exquisitely traced with gold. The upholstery is of scarlet plush, and a rich Wilton carpet covers the floor. The curtains are of a light drab color, and made of a new fabric-linen with silk dressing. At night the saloon is lighted with five elegant globe lamps. The metallic parts and fixtures are all silver-plated, and every thing throughout is finished in the most perfect manner.

"When arranged for day use, the Woodruff coach has no appearance of being a 'sleeper.' The old system of storing the bedding, etc., overhead, making the car top-heavy and unsteady in motion and partially obstructing the windows, is entirely done away. The beds and bedding are packed under the seats. Instead of wooden partitions between the divisions, the berths are separated by curtains of green figured damask. Under the ordinary system, as just noticed, a great deal of dead weight has to be carried overhead, for the construction of the upper tier of beds. The new Woodruff patent, providing for the conveyance and storage of all this below, relieves each car of a top weight of from two to three tons. Under this new arrangement the car can not be top-heavy, and therefore becomes more safe No travel, however rapid, can throw it off its balance, and when passing over curves its equilibrium must be preserved. For this reason, a safety, as well as a sleeping-car, is the result.

"These coaches cost about sixteen thousand dollars each. They have been christened respectively 'Clara' and 'Fanny Fern.' In connection with two Pullman coaches they will form a daily line between Cleveland and St. Louis, by the way of Indianapolis. It is safe to predict that these coaches will be eagerly sought after, and meet the popularity they so richly deserve. The line is under the management of our well-known citizen, Colonel C. W. Doubleday, who has achieved a high reputation in this department of 'railroading.' Mr. Woodruff came with the new coaches to Cleveland, to give them a good 'send off' under his own eye. Mr. Philip Harvey, of Philadelphia, who has been 'running' sleeping-cars for fourteen years, and knows as much about the business as any man in America, will make one or two trips with them, to see that every thing is in perfect order.

"No coaches ever made have more completely robbed the rail of its discomforts, enabling the weary pilgrim successfully to forget that he is bowling along at thirty miles an hour, and sleep as comfortably as if between the sheets of his couch at home."

THE first consignment of Pullman cars to England was shipped recently from Montreal, by the Dominion line of steamers. It consisted of three parlor cars and three sleepers, which were built in the company's shops at Detroit, and so constructed as to be perfectly ready to be built on their arrival in England. They are shipped in cases by sections, the sills and long timbers strapped together. On arriving at Liverpool they will be conveyed to the Midland Company's shops at Derby, and there built under the supervision of Mr. A. B. Pullman and Mr. Longstreet, mechanical superintendent of the Pullman Company, who will take out a corps of men from the Detroit shops. Every thing is ready except the wheels. The English roads use a larger wheel than can be procured here, and hence the necessity for procuring them in England.

The Car-Shops of the Atlantic and Great Western Railway.

EDITOR OF THE NATIONAL CAR-BUILDER:

DEAR SIR: Being a reader of your valuable paper, and having noticed in its columns many descriptions of railway shops in different sections of the country, I am induced to send you for publication a few details respecting the car-shops and car department of the Atlantic and Great Western Railway.

This history of this road, on account of its vicissitudes of fortune, is familiar to all, and therefore need not be dwelt upon. It was opened to the public about ten years ago, its main line extending from Salamanca, N. Y., to Dayton, Ohio. About five years since, Mr. N. H. Marsh, formerly of the Lake Shore road, was appointed master car-builder of the entire line. Previous to his appointment, the car and locomotive departments were under one management. After the death of Mr. Marsh, which occurred about two years ago, Mr. J. H. F. Wiers, general foreman of the Kent shop, was appointed as his successor, and has been very successful in performing the duties of his position. As regards general efficiency, good condition of rolling-stock, order, neatness, and economy, we doubt if any road is more judiciously managed. The passenger equipment, consisting of day-coaches, is not surpassed in its completeness by any other cars of this class.

The repair-shop at Salamanca is in charge of Mr. J. T. Fosdick, who has long been connected with the road, and is a very efficient and faithful servant of the company. This shop employs 27 men, and has facilities for making all necessary repairs at this point. At Meadville, Pa., quite extensive shops were erected a year or two since, but are not yet in full operation. Machinery is being put in, however, and they will soon be running to their full capacity. The buildings are of brick, and well constructed. The present force consists of 85 men, who are kept busy with general repairing. These shops are in charge of Mr. D. S. Dockstader, who is a veteran in the service of the road. The shops at Cleveland are wooden structures, where the repairing is done for the Mahoning division. They are in charge of Mr. W. G. Haggard, and employ 58 men. Mr. Haggard has occupied his present position for six or seven years, and is an efficient servant of the company. A few men are also employed at Youngstown in making repairs for the lower end of the division.

The shops at Kent, Ohio, are of cut sandstone, and are first-class structures of the kind. The "head-house" is 165 x 70, and two stories high. The lower floor has six tracks, four of which are devoted to the construction and repair of passenger and baggage-cars. Some of the heavy machinery is also on this floor. The upper story is devoted to offices, upholstery and cabinet shops, and light machinery. There are also attached to the head-house two wings, one 320 x 50, and the other 175 x 55; a portion of the former being used as a wood machine-shop, and the latter as a machine-shop for the locomotive department. The blacksmith-shop is 175 x 50, and contains 24 forges. The shops are furnished with first-class machinery throughout, a considerable portion being of home manufacture. Their full capacity is equal to the turning out of 40 or 50 freight-cars per month, and 15 or 20 passenger-cars a year. The buildings are all intended for the car department, those designed for locomotives never having been constructed.

During the past eighteen months, a number of first-class passenger-coaches have been built, equal to any in the country in point of design and workmanship, and especially as regards easy riding, which is attributable to an excellent quality of springs used, and manufactured by Messrs. A. French & Co., of Pittsburg. The wheel-base of the trucks has been extended to seven feet, and gives entire satisfaction. No difficulty has been experienced from broken equalizers, or going down of the truck at centre; and experience thus far teaches that by doing this a steadier motion is secured to the car-body upon a four-wheel truck. There are at present in the shop two coaches ready for the painter, which are no discredit to designer or builder. The interior is finished with mahogany, relieved with light walnut mouldings and panel-work, and altogether they will be models of beauty. There are employed at these shops 159 men. Mr. S. V. Smith has charge of the shops, having suceeded Mr. Wiers, and is well qualified for the position.

Mr. J. W. Holmes has charge of the shops at Galion, which employ about 25 men, and are wooden structures. A few men are also employed on temporary repairs at Dayton, and as inspectors at Cincinnati.

In respect to economy, which is an important consideration in this as well as all other departments of railway operation, it may be stated that the aggregate number of hands in the shops as aforesaid, including foremen, clerks, storekeepers, and other necessary help, is 379, and the last monthly pay-roll was $21,008.11. There are at present on the road over 6000 cars of all classes, including 66 coaches and accommodation cars, 41 baggage and mail-cars, 1884 box-cars, 983 coal and flat cars, 561 stock-cars, 80 oil-tank cars—all broad gauge; also 1699 coal-cars, and a few miscellaneous, all narrow gauge.

About one half of the box-cars, and a large number of the coal and flat cars, are supplied with Vose, Dinsmore & Co.'s rubber centre spiral springs, which give entire satisfaction, and for cheapness and durability are not surpassed by any other. With the above-named force in the car department, this large equipment is kept in good running order; and I would ask, in conclusion, if there are any other roads in the country, with 600 miles of main line and divisions, that can make a better exhibit? EMPLOYEE.

KENT, OHIO, July, 1873.

An Enormous Engine.

Pittsburg claims to have in process of construction a pair of engines which will be the most powerful in the world. Reducing the capacity of some of the largest pumping engines to a uniform lift of one foot in twenty-four hours, it is found that the one at the Lehigh zinc mines will lift 3,456,000,000 gallons; the pair at the Chicago water works, 4,500,000,000 gallons; the pair at Haarlem, Holland, 10,000,000,000 gallons; while the new Pittsburg engines will lift 14,240,000,000 gallons. The pair will weigh 1500 tons, and will cost $423,550. The following dimensions will serve to give some idea of its magnitude: Cranks, nine tons; shaft, twenty-four tons; four sections of the two valve chambers, one hundred and twenty tons; fly-wheel, seventy tons. The four plungers will weigh upwards of four hundred tons. Cylinder, sixty-four inches diameter; stroke, fourteen feet. Plungers forty inches diameter; eleven foot stroke. This ponderous piece of machinery will be used to raise water into Highland avenue reservoir in Pittsburg, a height of three hundred and fifty-six feet. It is estimated it will raise seventy million pounds of water for each hundred pounds of coal consumed, the cost being at the rate of one cent for every 3070 gallons.

A California Postal Car.

A WRITER in the June number of *Scribner's Monthly* says: "It is especially on the Western lines that we meet with the modern postal car in all its glory of latest improvements, fine upholstery, varnish, and gold leaf. A fair specimen is one I saw on the Central Pacific Railroad, at Ogden, which might justly be called a palace postal car. It was built in the company's shops at Sacramento, California, under the advice and suggestion of Messrs. Barstow and Alexander, of the Post-office Department, and constructed in a very ingenious manner, with a view to economize space and facilitate the dispatch of business; while due regard had also been taken to the comfort of those who, on the long journey over the road and back, would have to occupy it as their home—bed-room, parlor, dining-room, and work-room combined. One end of this car was taken up as a semi-circle of boxes or large pigeon-holes, receptacles for newspapers and packages, each of which bears a label with the name of a station on the route, and connecting or distant routes. These boxes were so arranged that the person distributing the mail matter had every box within convenient reach. At the opposite end of the car were a number of smaller receptacles or pigeon-holes for letters, to the number of several hundred, all arranged in a certain order, and labeled with the names of stations and connecting routes. In the middle of the car was an apartment for the use of the clerks, with washstand, wardrobe, beds for three, a table, chairs, and other conveniences, not unlike the cabin of a vessel. There was also a place where a cooking stove could be arranged for the convenience of the clerks, if they desired to keep their own *menage*. The remaining portion of the car was set apart as store-room for the mail-pouches, bags, and packages, containing the through-mail from San Francisco to Ogden, and further east, or *vice versa*, which does not require assorting on the road. Several cars of the same pattern—all finished in the highest style of the art of car-building—have since been constructed by the same company and put upon their road, where they give universal satisfaction to the Post-office employees and all others interested."

A Silver Locomotive.

THE Newark (N. J.) *Advertiser* says: "We have been shown by Messrs. Durand and Co. an admirable piece of their workmanship, consisting of a miniature silver locomotive and tender, measuring six inches from end to end, perfect in all its parts. The most delicate portions of the machinery have been carefully reduced and the exact proportions preserved throughout, even to the movable latch on the furnace door and the clapper on the little bell, the mouth of which measures less than one eighth of an inch. The patent steam-brake and all the modern improvements have been added. The color of the Russia iron parts have been accurately imitated by oxidization, and the brass parts by gilding. The whole thing rests upon a Tennessee marble base, upon which is a double track, with the accompanying telegraph poles, wires, etc. The engine and tender is composed of over 700 pieces, and is the result of three months of labor. It is designed for a paper weight, and an expensive one it is. We understand it is to be presented to a prominent telegraph or railroad president." Why not send it to Vienna?

THE managers of the Northern Central Railway Company have within the past two weeks placed upon their road eight new passenger-cars, the wood-work of which is finished in a beautiful manner. The panels between the windows are of polished root ash, and the trimmings of polished walnut, relieved with delicate carving and gold stripes. The old-fashioned flat-top windows have been abolished and the circular head adopted. The ceilings of the cars are frescoed in a beautiful manner, and each car is supplied with self-acting ventilators, which not only permit currents of fresh air to rush through, but effectually exclude the dust. Important features in the fitting up of these cars are the stoves, of a peculiar pattern, so constructed that the feet of passengers in cold weather are kept comfortable by placing them on metal chambers that radiate from the stoves. The interior painting of the cars is of a bright, cheerful color, and the exterior of a brownish crimson, which is most beautifully set off with stripes of gold. The cars were constructed at York, Pa., and a large number of the same style are being built.

IT is proposed to adopt a new form of sleeping-car on some of the British railroads, the primary object of which is to obtain perfect exclusiveness. The car is divided into five separate compartments, which have no communication with each other, but are all capable of access by the train attendant. Four of these are

furnished each with lavatory and other conveniences, and the fifth is the baggage room, containing also the furnace, which, by means of hot water pipes, heats the car. It is also the apartment occupied by the attendant, who may be signalled from any of the others by appropriately arranged bell-pulls. Three of the four passenger compartments are first-class; the other, of inferior size and furnishing, is second-class. The four are furnished with berths, the lower ones convertible during the day into seats

COLONEL GREENWOOD, Chief Engineer of the Denver and Rio Grande Railway, claims that in going around curves, cars of the same weight on the narrow gauge are the safest. He says: "Now, in giving this question an impartial investigation, we must confess that while at first sight it looks as though the broader the gauge the better the cars would stick to the track going around curves, the real truth is the opposite. The tension line of draught is parallel to the grade-line, the iron and the curved line of the alignment of the train is preserved by the flanges crowding against the rail and pushing the car into the curve; hence, since the wider the gauge the longer the outer rail, over which distance the outer wheel must slip ahead or the inner back, there will be a certain extra cramp, the tendency of which will be to help the inner flange to crawl over the rail and let the car off the track. Therefore, cars of the same weight on the narrow gauge are the safest."

THE general repair-shop and railroad-car works of Messrs. Bushtayoff & Williams, on the outskirts of Moscow, Russia, cover an area of more than sixty acres, and were constructed at an expense of more than 1,000,000 silver rubles. It is the greatest shop in Russia, and enjoys the patronage of the imperial government to the fullest extent. About 1200 men are now engaged in the shops, and extensions under way will enable the firm to work to advantage 2000 artisans. Most of the buildings are two stories in height, and are all fitted with the most approved machinery, constructed from American models. The establishment is building cars, turn-tables, and other things pertaining to a railway. One item alone will serve to show the extent of its contracts—it is to build 4000 cars for the government, and every month this number is swelling by new contracts. Mr. Williams, who is manager of the great concern, is a gentleman from Connecticut.

THE plans for the new shops of the Chicago, Burlington, and Quincy Railroad, at Aurora, Illinois, are all perfected and work is to commence forthwith. The new shops will be of brick, stone, iron, and slate, and are designed to be fire-proof. They will comprise a shop for the construction of passenger-cars, 310 feet in length by 80 feet in width; another shop of the same dimensions for the construction of freight-cars; a building 300 x 80 feet in size for wood-working, and one 200 x 80 feet in size for a blacksmith-shop and locomotive construction department. The walls are to be of brick and the roofs of slate

A WORCESTER man claims to have constructed the smallest steam engine in the world, with a boiler holding three drops. The engine, boiler, governor, and pumps stand in a space seven sixteenths of an inch square and five eighths of an inch high, and contain one hundred and forty-eight distinct parts. The longest screw is one eightieth of an inch, and the smallest about one thousandth of an inch in size.

THE Chesapeake and Ohio Railroad is completed and in operation from Richmond to the Ohio River, a distance of 420 miles, at a cost with the equipment of over $35,000,000, and the rapid development of its business indicates that the earnings for the ensuing twelve months will not be less than $3,000,000, and for the succeeding year not less than $5,000,000.

AT a meeting of the directors of the Lake Shore and Michigan Southern Railway Company, held at the office of the Union Trust Company, No. 73 Broadway, New-York, on the 2d July, Cornelius Vanderbilt was chosen a director and president, to succeed Horace F. Clark, deceased.

THE shops of the Chicago, Rock Island, and Pacific Railroad, at Englewood, are being increased by the addition of several new buildings, including a paint-shop 220x80, a foundry 194x65, a pattern shop 40x75, and a fire-proof structure 60x25, for storing paints and other combustible material. The buildings are all of brick, and rest upon stone foundations. The car department is in charge of Mr. B. K. Verbryck, formerly of the Erie Railway. During two years previous to the first of April last, the following cars have been built at these shops: 15 passenger-cars, 4 sleeping-coaches, 5 postal, and 7 baggage and express cars; also 276 stock, 250 box, and 7 caboose-cars. About 200 freight-cars have also been rebuilt. Mr. Verbryck is now constructing 7 first-class passenger cars, seating 55 each. They are 48 feet long, have 4-wheel trucks, Miller platforms, and Westinghouse brakes. The passenger-cars of this road are all of one style of finish outside, but the inside presents considerable variety. They all have the Westinghouse air-brakes and Miller platforms.

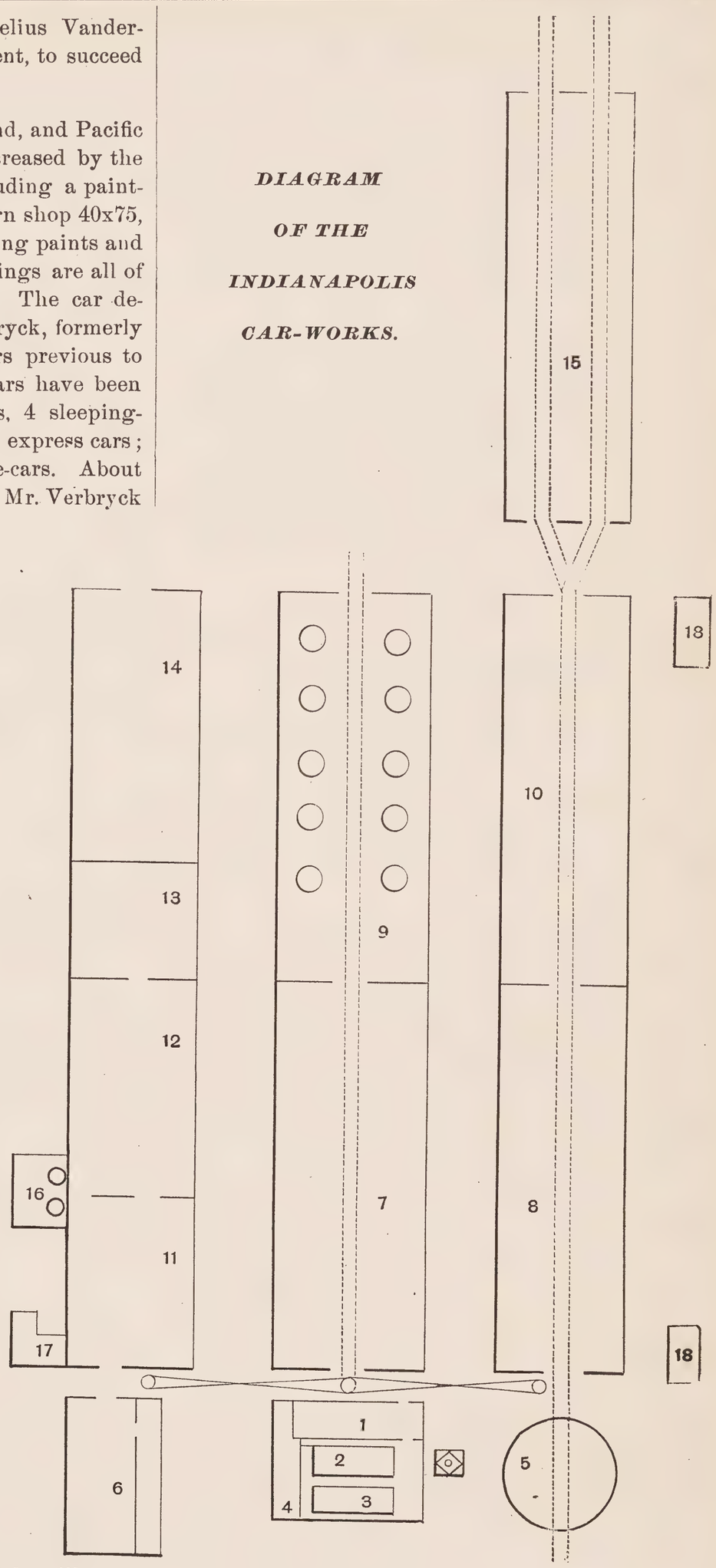
THE newly-constructed works of the Harrisburg Car Manufacturing Company are much larger and better arranged than the old ones which were destroyed by fire. The original works were established in 1853. The present works occupy an area of twelve acres of ground, and consist of 28 substantial buildings adapted to the various purposes required. The aggregate cost of the machinery is estimated at $175,000. The company manufacture all classes of railroad-cars, also car-wheels, castings, forgings, bolts, bridge-work, etc. The capacity of the establishment is 4000 eight-wheel cars annually. The capital invested is $500,000, and a force of 800 men is employed.

THE Piqua (Ohio) Car and Agricultural Works, of which John O'Ferrall & Co. are the proprietors, consist of a foundry 45 x 100, a machine shop of same dimensions, a wood-work shop 45 x 120, and a blacksmith-shop 40 x 90. Three additional shops are being constructed, which will constitute the car department. The present capacity of the works is from three to six cars per day, exclusive of the agricultural department.

THE rolling-stock of the Lake Shore and Tuscarawas Valley Railroad is to be increased by 300 coal-cars, 20 box-cars, six passenger-coaches, two baggage-cars, and two locomotives, all of which have been ordered, and are under contract to be delivered during the present month. The baggage and passenger-cars are being built in Dayton, at a cost of $35,000, and the locomotives at Dunkirk, at a cost of $25,000. The road is in excellent condition for business. It is estimated that the earnings for July will not be less than $40,000.

IN every car on the Connecticut River Railroad there is a box overhead, at one end of which is contained the name of the next station, which it is the duty of the brakemen to change as they leave the stations. And it goes further; it states where they connect with other roads. As the change is made, a bell strikes twice, which attracts the attention of the passengers, so that the box always exhibits the name of the next station, and so on. Thus passengers always know the name of the stopping place, and also if it connects with any other railroad.

DIAGRAM OF THE INDIANAPOLIS CAR-WORKS.



1. Engine Room,
2. Boilers,
3. Boiler-Room, } 50 x 60.
4. Store-Room,
5. Turn-Table.
6. Pattern-Shop, 2 stories, 45 x 60.
7. Machine-Shop, } 315 x 60.
9. Blacksmith-Shop. }
8, 10. Wood-working Shops, 315 x 50.
11. Machine-Foundry,
12. Car-wheel Foundry,
13. Annealing-Room, } 315 x 50.
14. Boiler-Shop,
15. Erecting-Shop, 172 x 50.
16. Cupola.
17. Core-Oven.
18. Closets.

THE works of the Indianapolis Car Company have been recently constructed, and are situated in the north-eastern part of the city of Indianapolis, just outside the corporate limits. The size and relative position of the various buildings are represented in the diagram. The entire works occupy an area of 35 acres, and are designed for the manufacture of railway-cars, stationary and portable engines, and general machinery. There are four main buildings, each of which is of brick, with slate roofs. The erecting shop has a capacity for ten freight-cars at a time. Near this shop is a scale for weighing cars. The various other shops are supplied with tools and machinery of the best and most improved description, and are in all respects adapted

to carrying on the business for which they are designed, in the most economical and effective manner. The power is supplied by a 200 horse-power engine. The fly-wheel is 16 feet in diameter and 30 inch face. There is an extensive drying-kiln for timber, by means of which 60,000 feet can be dried per week. The blacksmith-shop has ten forges with four fires each, which are supplied with air by blast-pipes. When in complete running order, the works will give employment to about 600 men, and will turn out eight cars a day, exclusive of general machine work.

The company have built twenty cottages in the vicinity, containing six rooms each, for the accommodation of their employees; and in case any of their workmen desire to purchase one of these houses, they can pay for it in monthly installments. The company are now prepared to fill orders for cars and machinery with the utmost despatch. The officers are, F. Ruschhaupt, President; Gustavus Zschech, Superintendent; and William Dunham, Secretary.

The Boston Convention.

We give place to the following comments on the recent Master Car-Builders' Convention and its doings, sent us by a member who was present. The writer expresses his views very frankly, and it is possible they may not meet the approval of all our readers, nor of all his fellow-members. If so, we shall be glad to hear from the other side.

"Editor of the National Car-Builder:

"Dear Sir: There is, perhaps, no better place for studying individual propensities, and peculiarities of character and disposition, than in an assemblage of men of a particular class, convened for the purpose of promoting, by associated action, the interests of a special department of industry—an assemblage, for example, like the recent convention of the Master Car-Builders, at Boston. There are exhibited on such occasions many phases of human nature. Some are controlled by prejudices more or less deeply rooted; others by local or personal considerations, which are kept as much as possible in the background; some exhibit great tenacity of opinion, originating in self-interest, or the habit of looking at things from a particular stand-point; others, with less self-reliance, hold their opinions in reserve, and wait to have them confirmed or unsettled; some have been unconsciously misled by fallacies; some are undecided in their views, and seek for more information; and others are disposed to subject their opinions already formed to re-examination and comparison with those of their fellow-members, with the view of rectifying or modifying what is erroneous. These peculiarities were very apparent in the discussions and doings of the Boston Convention, a body composed of practical railway mechanics, who had worked their way up from the ranks by regular gradation. That there should be some narrow-mindedness and stubbornness of opinion, is not surprising, when it is considered that the opportunities of many for acquiring broader views have been comparatively limited, extending scarcely beyond the shops or the roads where they first learned the rudiments of their vocation. This class of minds are greatly benefited by association. They recognize and admit the force of demonstrated facts. With all their tenacity, they are too candid and truth-loving to sin against light and knowledge. Many of these men came to the convention with one idea upon the axle and journal question—an erroneous one, perhaps—but they showed their willingness to be influenced by argument and the judgment and practical experience of others, in reaching a result which we think they will in the future have no reason to regret.

"When the roll of members was called, we were sorry to note so many absentees, although the actual attendance was respectable as to numbers. Did these absentees remain away from lack of interest, or inability to attend, or from dissatisfaction as to the manner in which the meetings are conducted? This non-attendance is not a desirable thing for the prosperity of the association; but in some respects it may be for the best. It may have its good results. If the elements of discord, and whatever tends to distract the counsels and impair the usefulness of the organization, are thereby lessened, no one will regret the withdrawal of the dissatisfied ones, especially as their places were made good, to a great extent, by a very gratifying reinforcement of new members; so that it remains a question as to whether the association is not rather strengthened than weakened by their absense. An ex-member was once asked by an outsider why he did not attend the convention which happened to be in session at the time. The reply was, that if he wished to 'get on a drunk,' he could do so at home; as much as to say that a gathering of this kind was merely an occasion for having a 'high old time,' or, in other words, a frolic in the disguise of business. Now, for the benefit of those who have such erroneous notions respecting the character and purposes of these conventions, the writer would say that he attended the Boston meeting in the capacity of a new member, and partly for the purpose of ascertaining, by personal observation, whether there were any just grounds for imputations like the above; and he can emphatically say that there are none whatever. Not a single case of intoxication, or any conduct unbecoming a gentleman, among the members of the association, came under his notice during their three days' session, or while enjoying the hospitalities which were tendered them by the business men of the city of Boston.

"There is one evil, however, which can not well be passed over in this connection, and which reflects more or less discredit on the members of the association, collectively as well as individually. We refer to the 'Cheap John' whisky-shop business that is usually carried on in every available room near the stairway landings of the hotels where the members have their headquarters. The proprietors of these extemporized saloons are usually 'on the make.' To use a conventional phrase, they have 'axes to grind.' Now it is perfectly right, and proper, and legitimate for these persons to solicit custom, and recommend and sell their wares; but why can't they do it without the instrumentality of a miniature bar-room, and the reflection upon their customers which such an appeal to their sensual appetites implies? We hope to see this thing reformed. The Master Mechanics' and Car-Builders' Associations can put an end to it in a very short time, if they will only set about it. Nine tenths of the guzzling done at these meetings proceeds from this source. Then why not discountenance it, and clear our skirts of the reproach? In saying this, we do not take back or modify what we have already said—that we did not see one member of the convention who was perceptibly under the influence of liquor. But this is not the only point. There are too many hired 'breath-smellers' around on such occasions, whose business it is to note every little indiscretion that men may be led into, away from home, and use it as a lever to injure the organization to which they belong. This is the way in which much of the cant about 'a high old time' originates.

"Before closing our temperance lecture, we will refer to a little incident which occurred in New-York on our way home, and which goes to show that car-builders even, will, in exceptional cases, and under strong enticement, coquette a little with the flowing bowl, but not when on duty. A Western member was seen rushing down Broadway, with his hands pressing upon his diaphragm, and meeting a brother member from the palmetto region, eagerly inquired for a drug-store. Our Southern friend, misapprehending the real nature of the difficulty, and being a little jolly himself, naturally supposed his Western brother was more in need of spiritual than literal drugs, conducted him to a saloon from which he—the palmetto man—had just emerged. The sufferer was enraged at such trifling with his misery. A drug-store was speedily found, the colic relieved, and when last seen, the Southerner was trying to persuade his convalescent friend to take a drink and make up. We believe this was about all the dissipation which attended the Car-Builders' Convention for 1873.

"If space permitted, considerable might be said respecting the work done by the convention. There was more really important business transacted for the benefit of railroads than at any previous meeting, so far as we can judge. The Dictionary of Terms was only second in importance to the question of a standard axle. It had hung fire for a longer time; and from the action taken upon it, we are now satisfied that it will in due time be completed. There is certainly great need of such a work. The association, after considerable see-sawing, have placed the matter upon such a basis as to insure success. Some doubts, it seems, were entertained as to the practicability of raising the necessary funds to defray the expenses of publication. It is very clear that if the association assume the publication, the constitution covers the whole ground as to how the money is to be raised; for when members sign this organic law, they agree to support it. The constitution says that each member shall be assessed equal in amount to pay the expenses incurred by the association; and by assuming the publication of the dictionary, its cost is made a part of the current expenses. This is the pith and marrow of the matter about which there was, we think, about an hour's wind wasted in unnecessary talk. In regard to the axle question, probably three quarters of the members would have admitted before the meeting that the size adopted would be what it is. We here see the advantages of free discussion and interchange of opinions. If any one will examine the table of dimensions used by different roads, as published in the *Railroad Gazette* previous to the meeting, they will find that a majority of the roads there reported, were using a $3\frac{1}{4}$ by $5\frac{1}{2}$ journal, and only seven roads were using a journal 7 inches long, and none a journal $3\frac{3}{4}$ in diameter. Surely a revolution has been accomplished which indicates that this is an age of progress. We are glad to see that men who thought, and still think, their little journal was good, are ready to admit the force of the arguments in behalf of reform, and concede that there is something better than the old pattern, and that it was a good thing for them to become members of the Master Car-Builders' Association.

"All things considered, the recent convention was a decided success. May all future ones be equally harmonious, agreeable, and useful. A Member."

Friction, and the Size of Journals.

Editor of the National Car-Builder:

Dear Sir: I notice in the June number of your valuable journal a communication on the size of axles, signed "Veteran Car-Builder," in which the writer manifests considerable surprise at the increased size of journals advocated by sundry gentlemen connected with railway-car departments, and gives it as his opinion that any increase of the journal over $6\frac{3}{4} \times 3\frac{1}{4}$ is a useless waste of material, and that the experience of the best roads has proved that this size is fully equal to all requirements. With all deference to the writer's opinion, I can not see on what grounds he can claim that a journal of the dimensions named is safer or more economical than a larger one. It has been my business for many years to fit up and examine journals of this description, and my experience is that they fall far short of performing the service they ought to perform with any degree of safety. On the road with which I am connected, we have strict orders to condemn and throw into the scrap-heap, as wholly unfit for further use, axles with this size of journal, for either of the three following reasons:

First, When the axle, no matter what its size may be, has been in service a year, even if the journal is nearly its original size; because the managers think it may have become crystallized to a certain extent on account of its inability to withstand the jars, shocks

and vibrations to which it is subjected while running under passenger-coaches.

Second, When the diameter of the journal is worn to 3⅛ inches—and in many cases they are much smaller than this when taken from under the coaches, and present a very dangerous appearance. A careful examination of them proves that the pressure to the square inch has been such as to produce a certain degree of abrasion, as the diameter could not have been so much reduced by a few months' wear.

Third, In case the axle is bent, and particularly the journal, which in consequence of its slender proportions is frequently found bent close to the inner collar whilst pressing off the wheels. These wheels, when running under passenger-cars, wear out in about six months, possessing as they do a certain degree of elasticity, and from continual vibrations, the hub contracts and unbeds itself in the axle-seat; so it is necessary that the journal should be of a size adequate to resist the pressure without bending.

For these reasons, it seems to me that a larger journal is not only safer, but more economical from the fact that it is attended with much less waste of material.

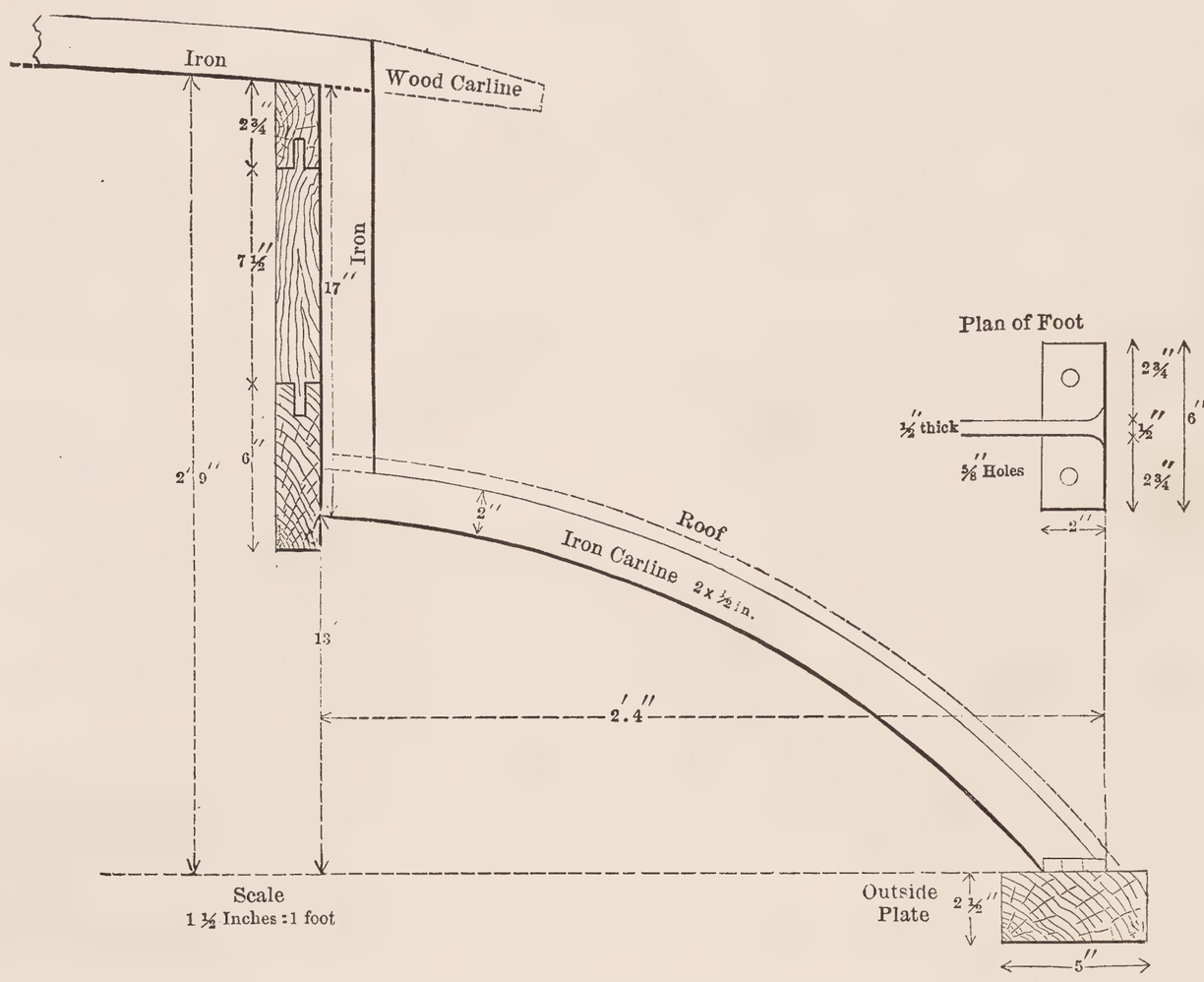
But the principal objection which the writer urges against an increase of journal diameter is that it will necessarily be attended with an increase of friction, and this he proceeds to demonstrate by showing that in a large journal, more surface passes under the bearings, with every revolution of the wheel, than in a smaller one. He is silent, however, with regard to the number of square inches which the brasses rest upon, and the pressure upon each square inch. Now let us examine and see if what he says is correct. We will suppose, in the first place, that the two brasses rest upon or cover one third of the circumference of a 6¾ x 3¼ journal, the length of the brass being 6½ inches. The weight of the car in this case rests upon a journal surface 21⅛ square inches, this being the product of one-third of the journal circumference and the length of the brass. A 6¾ x 3¾ journal, estimated in the same way, will give a bearing surface of 24⅜ square inches, which is an excess of 3¼ square inches over the bearing surface of the smaller journal, the weight on the larger journal being distributed over 3¼ inches more surface than on the smaller one. Now let it be assumed that one eighth of the weight of an ordinary 19-ton coach, with its complement of passengers, rests upon each journal, and that this one eighth, after deducting the weight of axles and wheels, is 4750 pounds, which would be 225 pounds to each square inch of bearing surface of the 3¼-inch journal, and only 195 pounds to each square inch of the 3¾-inch journal, making 30 pounds less weight per inch on the large journal. This shows very clearly that the small journal will create more friction than the larger one, because of the concentration of a greater weight upon a smaller surface. There is also another consideration which must not be overlooked in our efforts to get at the truth of this disputed problem, and that is what is apparent at a glance, namely, the less convexity and nearer approximation to a plane surface of the larger journal, with a corresponding tendency to diminish friction; for it has been proved by scientific experiment and attested by the most competent engineering authority, that friction is independent of the velocity of motion, and of the extent of surfaces in contact when the pressure remains the same. These facts, in connection with other considerations which might be named, make it quite evident to my mind that a 3¾-inch journal has less friction than a 3¼-inch one, the principal reason being that there is less pressure to the square inch of bearing surface.

I claim that a journal of the former size will run five years without abrasion or bending, and that it will remain true when new wheels are pressed on or off. As regards crystallization, the stanch dimensions ought to dispel all fears of trouble from that source.

I feel persuaded that if "Veteran Car-Builder" will carefully investigate this subject, he will be convinced that his theory is fallacious. He seems disposed to credit Mr. F. D. Adams with the introduction of the large axle, but I am inclined to think the movement did not originate with any one individual, but proceeded from the suggestions and practical discernment of practical men, among whom Mr. Adams holds a conspicuous place. MACHINIST.

Fastening Iron Carlines.

THE cut represents one of the various methods of fastening iron carlines. A section of the roof is shown, which is a very light one, the walls of the raised deck being only about 1¾ inches thick. It is, however, well adapted to a variety of designs as respects roof-framing. It will be noticed that neither the upper nor lower plate is notched for the iron, which passes up on the outside of each—an arrangement which adds materially to the strength of the framing of the raised deck. The curved parts of the iron are held between two wooden carlines, which are bolted to it. The vertical part projects outside of the wall of the deck. The deck is framed of ash plank, the lower piece being 6 inches deep, and the upper one 1¾ inches, forming a stiff truss extending the whole length of the roof, and resembling the style used by Mr. Gleason, of the Old Colony Railroad. The foot of the iron carline is ⅝ of an inch thick, and is welded on. It is



held down upon the outside plate by two ⅝ No. 18 wood screws. As the iron projects outside the deck wall, the tin on the lower roof is cut and bent around it, and the first roof-board is in short lengths, fitting in between the perpendicular parts of the carline. Welding on the foot costs a little more than twisting the end of the iron and putting a hole through it, but it is a much stronger method of fastening, and makes a job enough better to more than compensate for the additional cost. The projection makes no difference in the external finish, which is of the usual pattern. The short wooden carlines are notched into the lower deck sill. Where the curves of the roof vary and are convex downward, the foot of the iron carline goes on in the same way.

The cut shows the elevation of the iron carline, and also a detached plan of the foot. The eaves of the upper roof are formed by allowing the long wooden carlines to project beyond the top plate, as shown in the dotted lines.

Fire-proof Stove for Passenger-Cars.

A very interesting trial of a fire-proof stove, for use in passenger-cars especially, was given recently near the corner of Oliver and High streets, under the direction of James Megratten, the inventor, and superintendent of the Enterprise Manufacturing Company of Wilmington, Del. The stove is, in form, composed of three upright cylinders and two cold-air boxes at the bottom. The fuel is placed in the inner cylinder. The cold air rushing in through the cold-air boxes drives the hot air outward and upward through the cylinders, the rounded form giving a very powerful radiation. The heat escapes through a register in the back. The whole is firmly bound with strong iron bolts. The doors are fastened by patent locks. At the trial referred to, the stove, after the fire in it was well under way, was thrown from the staging upon which it was placed, to the ground, a distance of six feet. It was then rolled about, tumbled over and over, but not a spark of fire was spilled upon the shavings which were scattered around. When the stove door was opened the fire was burning briskly.—*Boston Railway Chronicle.*

Maple Timber.

A MICHIGAN paper says: "Within ten or fifteen years the curled and birdseye maple timber of the west will be in active demand throughout New-England, Middle, and Southern States for cabinet ware and cabinet purposes. Twenty years ago mahogany was used for cabinet purposes throughout the east, but either the demand so far exceeded the supply or the taste changed, and at the present time walnut is *the* style. The supply of walnut, mainly obtained from Indiana, is decreasing. Indianapolis and Toledo are now the great business centres for walnut lumber. The northern half of Indiana has been already stripped of its walnut timber, and the saw mills have been removed to the southern portion of the State to consume what is still left standing. Musical instruments, furniture sets, sewing machines, and nearly every article of fashionable construction now in use, including fashionable coffins, all over the east and south, are made of walnut. Annually the price of this lumber rises, and as it grows dearer and scarcer it is beginning to be quoted in European markets. Last year New-England alone used 26,000,000 feet of walnut lumber in furniture, musical instruments, sewing machines, house trimmings, decorations, and coffins. The present rate of consumption of this timber will, within from ten to fifteen years, compel the adoption of some substitute, and curled and birdseye maple—of which there are large quantities in the forests of Michigan, Wisconsin, Iowa, and in portions of Canada—must be utilized. There will be no alternative. Europe, for the past, has been depending more and more largely upon American forests for timber and lumber, especially hard wood varieties, as witness the shipments from this village of large quantities of oak wainscoting for the Liverpool market. For many purposes it is superior in quality to any varieties that grow there. The consumption of various kinds of hard wood lumber in the United States annually for furniture alone is an immense business, and amounts to vastly more than many people are

aware of. In fact there is little if any timber of any kind now growing or standing anywhere in the United States that is not valuable and worth money. Maine, Wisconsin, Minnesota, and Michigan are four States a principal source of whose wealth consists in the timber and lumber business, interests, and industries."

The Petersburg Car Company.

We are glad to announce the organization of a new company at the South, for building cars. Some of the most substantial citizens of the enterprising city of Petersburg, Va., have subscribed a capital of $100,000 for this purpose, and the necessary buildings have already been constructed, and are now in readiness for active operations. The company was organized on the 28th of January last, by the election of T. L. H. Young, President; W. C. Lumsden, Vice-President; A. G. McIlwain, Dr. Thomas Withers, R. H. Jones, Jr., John Mann, G. B. Eanes, T. L. Johnston, and W. H. Baxter, Directors; W. H. Baxter, Secretary, and John Watson, Treasurer.

Since their organization, the company have been actively engaged in remodeling and fitting up the large and commodious building on the premises bought by them for their shops, and situated in the western part of the city, on the Appomattox river, and within two hundred yards of the Atlantic, Mississippi, and Ohio Railroad. These grounds comprise an area of between three and four acres, upon which are located a large foundry, a blacksmith-shop with six forges, a machine-shop adjoining, a three-story wood-working shop for machinery and patterns, and a construction-shop with transfer-table, and tracks for 16 cars. These buildings are all of brick, with slate or tin roofs. The machinery is now nearly all in position, and is of the most improved description, especially the wood-working part of it. The power is supplied from a Turbine wheel of ample capacity, and the company expect to be able to commence turning out ten or twelve cars per week by the middle of the present month. Contracts were given out for car lumber immediately after the organization, and the works will start with a supply of well-seasoned stock on hand. The supply will be kept up, aided by two large drying-houses, so as to meet all future contingencies of the business in this respect.

As regards facilities for procuring lumber and other material for car construction, the works are very favorably situated, having convenient access to the great sources of supply, and also switch connections with both broad and narrow-gauge roads, enabling them to ship cars to all parts of the country at a minimum cost of handling, and at lowest through rates of freight. The company have secured the services of Mr. John W. Fleming, for five or six years past the master car-builder of the Tredegar Works at Richmond, and whose experience and capacity amply qualify him for the position of superintendent of the new enterprise. The company design building box, flat, gravel, coal, and construction cars of the best workmanship, and with the latest improvements. We think that with the peculiar advantages of location, and the efficiency of its management, as indicated by the names of its officers and directors, these works are entitled to, and will receive, a liberal share of patronage. They begin operations under favorable auspices, and we believe them to be in every way reliable and worthy of public confidence. We refer the reader to their card in our advertising columns.

The Axle and Journal Question.

Editor of the National Car-Builder:

Dear Sir: I see by a perusal of the convention proceedings in your last number that, after much talk, coupled with persistent effort, a small majority was obtained for the big axle; and as some of those who constituted this majority seemed anxious to place themselves on record in favor of the axle, I will not hesitate to follow suit on the other side, and record my opinion against it, believing I can give good and sufficient reasons that it will prove a failure, and, if generally adopted, will be an incubus upon our railway prosperity. I wish, in the first place, to call attention to an extract from Vol. I., page 70, of *Chambers' Educational Course*, in relation to friction. These books are used in the English high-schools, and are considered good authority upon mechanical and scientific questions. The writer says, "Friction from weight differs in different bodies, and depends upon concurrent circumstances—as nature of surface, etc. Friction always increases in exact proportion as the weight increases, when all other circumstances remain the same. Any moving part of machinery, therefore, should be made as light as possible, consistent with strength and durability." I have never known any one to dispute this, or the quotation made by Mr. Adams in his remarks in the convention; but I can not see how he calculates the proper size of an axle from such data. In his communication to the July Car-Builder, he intimates his belief in the diurnal motion of the earth; and it may be that he has had a glimpse of the journal of the mighty axle on which it turns, and has unconsciously allowed it to influence his views. But, joking aside, if we are to have no guess-work in this matter, would not past experience be a safer basis for calculation than any amount of theoretical or book knowledge? Mr. Adams asserts that ten tons will run easier on a 4 by 7 axle than on a 3¼ by 5, which is very doubtful; but he knows better than to say this with reference to the axle I mentioned—namely, 3¼ by 6¾. He stated before the convention that he built some cars to carry 30 tons of stone, and that they carried successfully 36 tons of steel rail from Troy to Springfield with a journal half an inch shorter than the would-be standard.

Now it is very evident that those who favor the large axle are desirous of increasing the carrying capacity of our rolling-stock two and a half times what it now is, regardless of our long and severe winters, causing broken rails, to say nothing of broken heads. I think it should be apparent to every one that if we increase the size of our axles to this extent, our cars must be made proportionately stronger and heavier; for if they are not too strong now to carry ten tons, it necessarily follows that by putting in this monster axle, we shall add between five and six hundred pounds—chiefly of forged iron—to the two thirds present non-paying freight per car; and I will venture to say that if the time and labor expended in securing a meagre majority for this cumbersome axle, had been employed in devising means for diminishing the heavy burden of dead weight now dragged over our roads, and forming a part of our cars, railway corporations would have been largely the gainers.

I was gratified to read in your paper a few months ago, an account of a feat performed by Mr. Smith, of the Erie Railway, by which several thousand pounds of dead weight were taken from a box-car, wide gauge at that; but when this car is furnished with the standard axle, it will be as much out of proportion as a man with a child's body—the legs may be good for thirty-six tons, but the body will be satisfied with ten. In conclusion, I must express my surprise at the apparent ignorance of the convention, with the exception of two delegates representing the Lake Shore road, in reference to "Crystallization;" what it means, how it takes place, how detected, and what are its results, and whether it occurs before or after the axle has been used? These are pertinent questions; and if some of these gentlemen would furnish a solution of them, it would be very gratifying, and might be worth something to our employers.

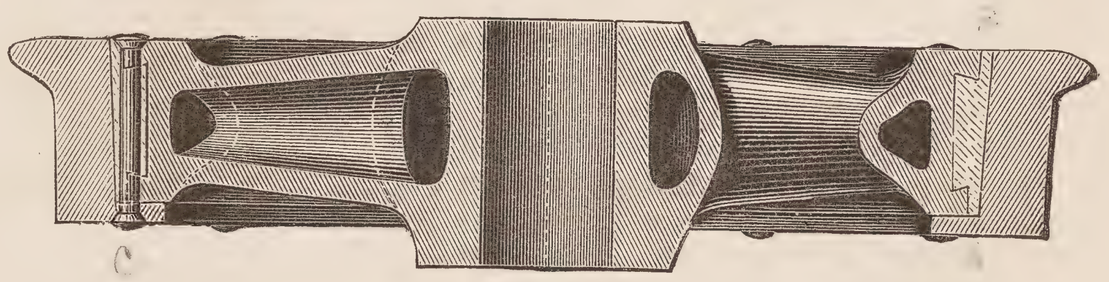
George Galloway.

Buffalo, 436 North Division street, July 22d, 1873.

Note by the Editor.—It is proper for us to say, with respect to the above, that Mr. Galloway is the author of the communication published in our June number, signed "Veteran Car-Builder," and also that he is not altogether responsible for that signature, as we took the liberty of substituting it for the one he attached to his former article, namely, "Fifteen Years among Cars." We thought it was more euphonious, and otherwise equivalent to about the same thing. We should not have taken such a liberty had we known what we now do, that he is comparatively a young man, and not at all ambitious of being considered a veteran, although an experience of fifteen years among cars, would almost entitle him to that distinction.

Elastic Car-Wheels.

When cars were first placed upon railways, the function of springs beneath carriages of any kind was little understood, and their value under loads of freight as little appreciated. The cars which were at first run upon tolerably smooth rails, and at slow rates of speed, did not appear in very strong contrast with the stage-coach hung upon thorough-braces, and were considered quite comfortable. But as the rates of speed increased, it was found that the heavier rolling-stock was pounding the life out of the light iron of that day, and at the same time destroying profits. To obviate this, two remedies were presented, and from inexperience the wrong one was applied; that is, it was decided to make all parts of permanent way and rolling-stock strong enough to resist the concussions—a method which has proved delusive, as many roads are even now finding out to their cost. The only real solution of the problem is to place springs beneath the load, as no amount of mere strength can successfully and economically resist such concussion. It has been thought, until quite recently, that drays and other vehicles for transporting heavy goods, did not require springs, and that any saving that might result from their use would not compensate for their cost; but no intelligent builder of such vehicles now considers them complete without a good set of springs; and as for railway cars of any sort, springs are considered indispensable. Even coal-cars, whose loads are from their nature less severe upon wheels and rail than many other kinds of freight, have a substitute for springs in the arrangement of their side-timbers. Almost every part of a passenger-car, together with its load, is supported by special springs; there are springs in the seats, the car-body rests upon the bolster springs, and a good portion of the truck is sustained by the springs upon the equalizers.



With all the care to prevent weight striking dead upon the rails, one part, and a most vital one, has been left utterly unprotected against this destructive hammering. Wheels, axles, and equalizing bars have been battered and worn out by incessant pounding, to such an extent that their weight has been materially increased beyond what actual strength requires. Now it is manifest that a spring, or some elastic element in the wheels, would go far toward obviating this. The wheel is, moreover, the proper place for a spring, because in such case the greatest possible part of the load will be above it, and the least below it. An elastic wheel is, therefore, a desideratum, and its importance becomes more apparent when we consider that the aggregate weight of wheels, axles, equalizers, housings, brasses, etc., will approximate 8000 pounds while the effect of the rest of the load is to aggravate the wear and tear of this part of the weight. It is one thing to suggest an elastic wheel, however, and quite

another thing to construct and practically set them running. One of the first materials used for rendering car-wheels elastic, was wood, a substance well adapted to the purpose, since it gives very little motion, and at the same time deadens and diminishes the jar very effectively. The faults of wooden wheels, as they are sometimes called, have been numerous, and are too well known to require mentioning here.

The wheel—a section of which is shown in the accompanying cut—was invented by Mr. H. W. Moore, and is manufactured by the Moore Elastic Steel Car-Wheel Company, of Jersey City. This wheel seems to be free from the difficulties attendant upon other attempts in this direction. The hub is of cast iron. In its outer edge, a dove-tailed groove is cut, into which, through a suitable slot, hickory staves are slid until the whole groove is filled. A cast-steel tire with the usual tread and flange, but having a flange projecting inwardly, is then forced on over the wood and takes a bearing upon it. Bolts then go through the inner flange and are riveted up so as to make every thing secure. The wood is indicated in the cut by the lighter shading. In this way a perfectly secure cushion of wood is obtained between the tire and the centre of the wheel, which very effectively deadens the jar and reduces it to a minimum. The tire being turned outside as well as in, runs very smoothly. This method of construction entirely overcomes the difficulty to which wood-wheels have heretofore been liable—that of getting loose and breaking down.

Excellent Regulations.

THE Pennsylvania Railroad has adopted the following regulations for the protection of passengers:

"It having been alleged that news agents having offered for sale in the cars of this company, without the knowledge of their employers, immoral and obscene publications, passenger conductors are directed to see that such publications are not sold, or offered for sale on their trains, and to immediately report any attempt to do so to the Division Superintendent.

"Passenger conductors are also instructed that the news agents are subject to their discipline while on their trains. They should see that they are not allowed to offer their commodities in such a manner, or with such frequency, as to discommode and annoy the passengers; and they should not permit any article sold which might soil or injure the upholstering of the cars or the clothing of the passengers.

"The sale of prize portfolios, gift confections, or similar devices partaking of the nature of lotteries, is forbidden on the cars of this company.

"By order of the General Manager.

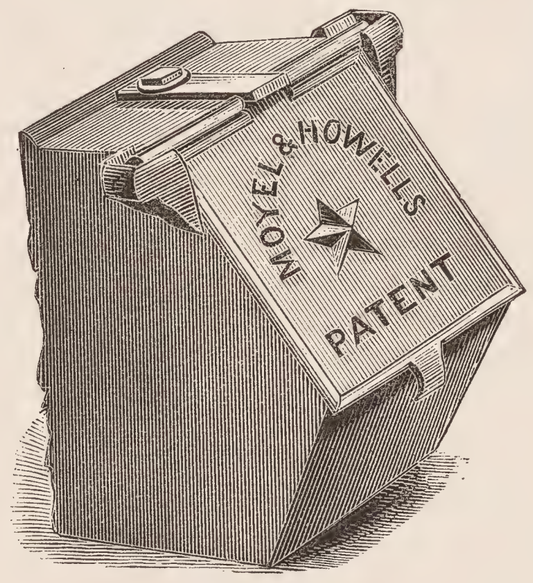
"Passengers are respectfully requested to report to the Division Superintendent any violation of these regulations which may come under their notice."

MESSRS. WILLIAMS, PAGE & CO., of Boston, have recently introduced a new style of safety car-lamp, requiring no chimney. It consists of a handsome case, either bronzed, gold, silver, or nickel-plated, open at the top, and firmly secured to the car by arms or brackets. Into this case, the lamp or oil fount sets, and is kept from touching the case by small springs, so that any waste oil passes down between the case and the fount, into the concave bottom of the case below the fount, from which it can be removed with cotton waste, when the lamp is lifted out to be filled. The fount is made of strong glass, or brass, as preferred. There is no possibility of the falling of the lamp, or of the dripping of oil on passengers, or on car cushions.

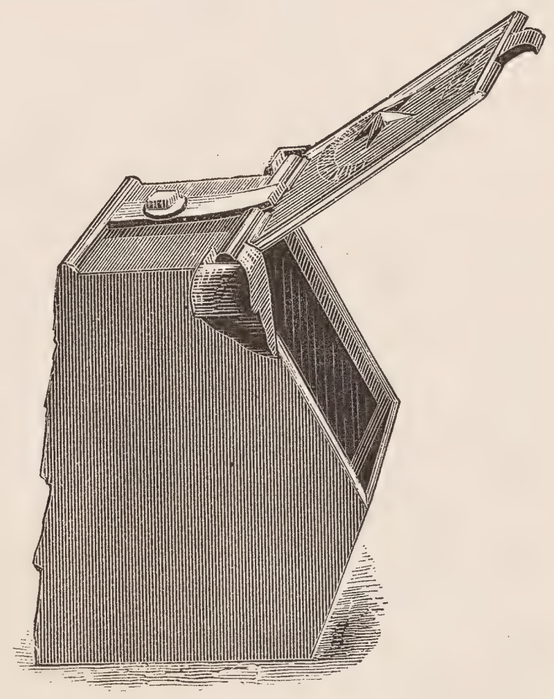
The globe to this lamp is held by a spring, giving an equal pressure around the base, thus rendering it less liable to break in cold weather, as globes and chimneys often do when otherwise fastened. This globe can be as readily adjusted or changed as a common lamp chimney. The wick is adjusted from the outside by means of a button in the usual manner.

Moyel's Car Axle-Box Cover.

THE engravings represent the front part of an ordinary axle-box with the cover attached, and which is hinged to the box by a shaft at its upper edge, resting in brackets on each side. The cover is held in place by a single-leaf spring fastened by a set screw, as shown in the cut, the end of the spring extending over and pressing upon a flattened place in the shaft,



with sufficient force to prevent the cover from being displaced by the jarring and vibration of running. When the cover is lifted with the hand, it is held open by the pressure of the spring upon another flattened place in the shaft. There is a lug on the inside of the cover at the top, which prevents it from being lost in case the spring should be broken. Dust is effectually excluded from the oil-box. This device has been in



use for several months on the Kansas Pacific Railroad, and gives good satisfaction. It is simple in construction, and is said to be the cheapest oil-box cover in use. Further information may be had by addressing the inventor and patentee, Mr. E. Moyel, Wyandotte, Kansas. Full-sized working models will be sent to parties who may desire to test the merits of the invention.

A Cooler for Hot Journals.

NUMEROUS preparations have been invented and applied for the purpose of cooling and lubricating railway-car journals, and put an end to the plague of hot boxes; but owing to some fault in the ingredients, or by an improper application of them, or no application at all, they have in most cases failed of complete success. At all events, the journals still continue to heat, more or less, and the boxes to blaze. We shall not attempt to determine the relative merits of the various mixtures and compounds in the market, but shall merely call attention from time to time to such as appear to possess undoubted merit, as determined by actual test and the disinterested judgment of railway men who make use of them. Our purpose in this paragraph is to say a word in favor of a new article called Touner's Patent Lubricator, prepared expressly for cooling hot journals, and now used very successfully on various Western roads. The written testimonials of sundry gentlemen connected with these roads, indorsing its merits as a most effective *cooler*, have been laid before us, and seem to be conclusive as to its utility. It is composed in part of an article called Tripoli, which is obtained in St. Louis county, Missouri, and contains about 95 per cent of silica. The compound is not affected by heat; it performs promptly the office of repolishing the journals, owing to its peculiar cohesive properties; and the lubricant proper is held in close combination with the Tripoli, thus polishing, lubricating, and cooling the journal at the same time. The testimonials to which we refer are severally signed by John F. Nolte, of the Rockford, Rock Island, and St. Louis; D. P. Tait, of the Pittsburg, Cincinnati, and St, Louis; and William D. Rowley, of the Union Pacific Railroads. Vose, Dinsmore & Co. are the agents in New-York.

Railway Hotels.

RAILWAY traveling, in the matter of comfort, is a great improvement on what it was even a few years ago. Still there was and is a want which we are glad to see announced is about to be supplied by the intelligent and enterprising President of the Baltimore and Ohio Railroad Company, who, it is said, has recently inaugurated a policy in regard to the erection of hotels along the line of its road which must win for himself and the company the commendation of the entire traveling community. It has been wisely determined that the old system of "fifteen minutes for refreshments," with its accompanying bolting of food and haste to regain one's seat in the car, has had, or at least ought to have had, its day, and with this in view, the company has resolved to make very marked improvements by constructing, at eight or ten different points along the main line and its branches, large and well-arranged hotels. In order that the guests may have reasonable time to appease their appetites, such arrangements have been made in the time-tables as will best bring about this result, and those who have had the pleasure of passing over the road and stopping at any of these hotels will agree that the object which was sought after has been accomplished. Two of the number are completed and are now open to the traveling public, while work on the others is being rapidly carried forward.

THE Litchfield, Ill., car-works were destroyed by fire June 27th. The loss in material, buildings, and machinery is estimated at $50,000, while the insurance, effected in St. Louis, is distributed among several companies, no single risk exceeding $5000. The total insurance is $50,000 on machinery and materials. The buildings were not insured, and belonged to the Indianapolis and St. Louis Railway Company. The car company had been in operation only a year, employing 250 persons, and were turning out 150 box-cars per month, exclusive of caboose and hand-cars. The works are expected to be able to resume operations by the 1st of August. All contracts will be filled without any more delay than the actual time consumed in rebuilding.

WE hear of numerous roads that have decided to adopt the standard axle, among which are the New-York Central and others under the management of Mr. Vanderbilt; the Erie Railway; Grand Trunk; Canada Southern; Norwich and Worcester; Boston, Hartford, and Erie; Indianapolis and St. Louis; Lake Shore and Tuscarawas Valley; Boston and Albany.

Mr. H. M. Perry, who for the last twelve years has been in the car department of the Hartford, Providence, and Fishkill Railroad, has been appointed Superintendent of the Atlantic Car Works, at Salem, Mass.

THE Tioga Railroad Company are going to have a new machine-shop and round house at Blossburg.

The National Car-Builder,
PUBLISHED MONTHLY,
BY
VOSE, DINSMORE & CO.,
32 WARREN STREET, NEW-YORK; 52 FIFTH AVENUE, CHICAGO; 720 NORTH SECOND STREET, ST. LOUIS.
JAMES GILLET, EDITOR.
Terms, One Dollar per Annum.

AUGUST, 1873.

Editorial Announcements.

CORRESPONDENCE.—*We cordially invite the coöperation of the railroad public in affording us the material for a good mechanical paper. Articles relating to rolling-stock and machinery, by those practically acquainted with those subjects, will be gratefully received. All communications must be addressed to Vose, Dinsmore & Co., No. 32 Warren Street.*

The name and address of the writer must accompany all communications designed for publication.

ADVERTISING RATES.—*For one square, or one fifth of a column, $5 per month, or $50 a year. For half a square, $3 per month, or $25 a year. Larger advertisements by special contract.*

All communications in regard to advertising should be addressed to L. F. DINSMORE, *Post-Office Box* 4055, *New-York City, who is our agent for advertising, and authorized to make contracts, collections, etc.*

ENGRAVINGS AND ILLUSTRATIONS.

We would invite the attention of Master Car-Builders and others to the advantages to be derived from publishing in THE NATIONAL CAR-BUILDER *engravings designed to illustrate the various features and details of car construction, and especially such improvements as can not otherwise be clearly presented. We will procure cuts to be made in the best manner from drawings or models that may be sent us, and charge only for the cost of engraving, inserting the same in our paper with suitable descriptive details, without charge.*

Railway Mechanical Associations.

IT seems to us there can be no reasonable doubt in regard to the usefulness of associations properly organized and conducted, for the purpose of promoting the interests of railways, especially in the departments of machinery and the construction of rolling-stock; yet if we are correctly informed, there are those among the higher grades of railway officials who are disposed to question the advantages of such organizations. There are doubtless some special, and perhaps plausible reasons that might be urged in support of this view of the case, but we think that a statement of them would present but a partial and one-sided representation of the facts, very far from the actual truth. To form a correct judgment in the matter is highly important. There can be no great difficulty in doing this if one is disposed to look upon all sides of the problem, and candidly weigh all the considerations which rightly belong to it. It will be understood that what we have to say has reference more particularly to the Master Mechanics' and Car-Builders' Associations, and the relations they sustain, as special organizations, toward the general railway interests of the country.

The more railways are multiplied and extended, the more they necessarily constitute a system in the proper sense of the term, and the associations to which we refer are the natural outgrowth or product of that system in its regular course of development. An individual road is not now the isolated affair it was twenty-five or thirty years ago, sustaining no relations with any other road except remote or contingent ones, adjusting its gauge in the absence of rule or precedent, and constructing its rolling-stock to suit the demands of its local traffic, and the pet mechanical theories of its managers and operators. It has now become incorporated, as it were, into a vast railway community, and forms a constituent part of an immense net work reaching all over the continent. It is subject to encroachment, antagonism, and rivalry, and must contend with these hostile influences by energetic effort and the best use of its resources. Its connections are such that its neighbors are not merely next-door, but a thousand miles away. An interdependence has been established, as unavoidable as it is indispensable, affecting all its interests for better or worse.

To construct a road at the present time, and put it in working order, requires energy, capital, and financial experience and ability; but after it has been brought to this point, its success as a business enterprise depends more upon the skillful and economical management of its machinery department than upon any other one thing. This department embraces a vast and complicated mass of details, each of which is so essential, that neglect or blundering incapacity is speedily followed by crash and ruin, sometimes hugely disproportioned in their magnitude to the trifling flaw which worked the mischief. To say that the management of this department has reached perfection, is equivalent to saying that car-builders and master mechanics are exceptions to the general run of humanity, and have already acquired all attainable knowledge pertaining to their respective vocations, and that what they do not know in this respect is not worth knowing. An assumption like this is a contradiction of all experience, and is disproved by the conflicting opinions of these men in regard to various mechanical problems, as appears by their annual discussions in convention. These men are eager for better and more reliable information than they now have, to enable them to fill the responsible positions they hold, with greater satisfaction to themselves and advantage to their employers; and they resort to the most effective means for obtaining such information. This, we think, would be very apparent to the higher officials to whom we have referred, if instead of holding themselves aloof, they would find time to look in occasionally upon the meetings of these associations, and listen to what is said in regard to some of the practical details of railway operation. They would learn from the spirit of the discussions, that those who participate in them have as great a solicitude for the safety and comfort of the traveling public, and for the business prosperity of the roads they represent, as the most plethoric stockholder or exalted official. They would listen to men who know what they are talking about; who are not old fogies or the slaves of cut and dried opinions; who are not content with this, that, or the other appliance merely because it serves its purpose very well, but are anxious to have it superseded by something better; who are progressive from life-long education and practice, ready at all times to test the utility of inventions and turn the best of them to account; who are, in fact, the foundation of the railway structure, the indispensable parts of the great machine. Upon their fidelity, judgment, and accurate mechanical knowledge, depend the safety and comfort of the traveling community. Their vocation necessitates incessant inquiry, hard thinking, and investigation. They can not afford to rest content with superficial knowledge, or to be misled by plausible theories. A mistake on their part brings loss of position and mechanical reputation. They must be prepared to act in the gravest emergencies at any moment, with a readiness of resource that permits of no procrastination. They are the true conservators of railroad interests, and well understand the needs of the system the more it expands—that it must be made homogeneous, which implies an imperative necessity for uniformity as far as possible in the sizes and patterns of the various parts of cars requiring frequent renewal, and where a chaos of diversity now prevails, causing endless delays, expense, and annoyance. The very important step taken in this direction by the master car-builders, in the recommendation of a standard axle, is a good beginning, and the wisdom of the step is already vindicated by the numerous roads which have signified their readiness to adopt it.

Now, in view of all this, and of the relations which subsist between these men in their associated capacity, and those occupying the higher but scarcely more important positions of superindendents and presidents, what, we ask, is the obvious duty of the latter, as superiors, toward the former, as subordinates, in the matter of organizing and maintaining associations for the purposes to which we have referred? Is it not clearly to afford every facility and encouragement to render such organizations useful, and of direct pecuniary advantage to the roads, by collecting and collating the results of individual experience for the general good, and thus making these associations the seminaries for acquiring and perfecting mechanical knowledge? It will, we think, hardly be contended that the yearly conventions of these men have thus far been fruitless of good results. If what they have already accomplished is of any value, it indicates that what they will do in the future, with better opportunities and larger experience, will be still more important in promoting railway interests. In this view of the case, it is incumbent upon road managers to contribute material aid, by paying all necessary expenses of their employees in attending the yearly conventions, and also aid them in their deliberations by such suggestions and counsel as they may be able to give. To withhold such assistance is niggardly and selfish; and to assume an attitude of indifference or open hostility, indicates that they have only to wait a few years longer to be convinced of their error.

We have heard it alleged that these annual meetings are designed more for recreation and social enjoyment than for business. While we are willing to admit that they are attended incidentally, and to some extent unavoidably, with the pleasures incident to friendly greetings and sociability, we deny that this is the paramount object. The record of what is said and done of a strictly business nature, shows that if recreation is the leading object, it must be a peculiar kind of recreation, not likely to be recognized as such by the generality of pleasure seekers. Those who are prone to indulge in this kind of luxury, do not hie away to Cincinnati and Chicago to escape the enervating heats of summer and recuperate wasted systems. An objection of this kind, it seems to us, would hardly be urged by any one who rightly appreciates the arduous and exacting nature of the duties of men in charge of railway shops. There are no greater slaves to business than they; none who have so little relaxation from exhausting and continuous labor. The brief annual respite afforded by a few days' attendance on a convention, where nine tenths of the talk is about business, to say nothing of the hard thinking which does not find audible expression, can hardly be regarded in the light of a frolic; and we are persuaded it is not so regarded save by an exceptional few, whose experience in the transaction of important business in organized deliberative bodies, is not very extensive.

The Official Report.

THE secretary's official report of the proceedings of the convention of Master Car-Builders, at Boston, will be ready for publication by about the middle of August. It will form quite a bulky volume, as compared with any of its predecessors, and will contain in addition to what appeared in the July CAR-BUILDER, a good deal of interesting matter of special value to members of the Association and railroad men generally, including the elaborate report of the committee on brakes, and the report of the committee of the Master Mechanics' Association on axles and journals. The volume will also contain the report of the committee, as made to the convention last year, at St. Louis, on the interchange of cars; a table showing the sizes of axles and journals used by different roads, as published in the *Railroad Gazette* of June 7; a table of standard screw-threads, bolt-heads, and nuts, adopted at Richmond, in 1871; a list of committees for the current year, and of members of the association from 1867 to 1873, inclusive; a diagram showing form and dimensions of the standard axle; the constitution of the association, and a complete index.

Several errors of minor importance escaped correction in the proceedings as published in our last issue. These will be corrected in the official publication, and also any others that may come to our knowledge. We are inclined to think that the discussions were, in the main, very correctly reported, as we have thus far heard little or no complaint from members about being misunderstood or placed in a false position.

Car-Builders' Monthly Meeting.

THE regular monthly meeting for July was held at the rooms of the Association, 113 Liberty street, on the evening of the 17th ult. A number of car-builders and others were present, including Messrs. F. D. Adams, Joseph Jones, and C. A. Smith, of the committee appointed by the recent convention at Boston, to determine upon a standard oil-box and bearing to be recommended for adoption by the various roads, in connection with the standard axle and journal. Messrs. I. W. Van Houten and D. Hoit, who are also members of the committee, were not present, and Messrs. Leander Garey, of the New-York and Harlem, and W. E. Chamberlain, of the Boston and Albany roads, were appointed to fill their places. After considerable consultation between the members of the committee, and before any decision had been reached, the models and drawings in their possession were laid before the meeting for examination, with the request that any suggestions in the way of improvement would be gladly received, as the committee had a very responsible duty to perform, and they wished to avail themselves of all the information that could be obtained on the subject, in order to present a pattern that would meet with general acceptance.

Mr. I. P. Wendell, of New-York, submitted a model, showing the application of his self-oiling journal-bearing, the oil being supplied to the journal by wicks passing through holes in the bearing, and fed from a chamber or reservoir above.

Mr. S. F. Gates, of Cambridge, Mass., exhibited a section of a box illustrating his automatic self-oiling method of lubrication. On the top and forward part of the box, and forming a part of it, is an air-tight chamber containing the oil, which is supplied to the journal whenever the latter becomes warm, so as to cause an expansion of the air and oil in the chamber, thus forcing the oil through the passage until the journal cools, when a partial vacuum is formed in the chamber and the supply is checked.

Mr. J. Adams, of Rochester, New-York, exhibited a model of a spring-lock axle-box cover, very simple in design, and apparently a very effective device for keeping the cover closed and preventing the entrance of dust.

Mr. J. B. Stewart, of Hartford, Ct., exhibited a device which has been used with much success for keeping the dust out of the back part of the oil-box.

An examination of the models exhibited by the committee, and consisting of two only—one furnished by Mr. Jones, and the other by Mr. Adams—elicited some criticism upon one or two points, but the general design of both seemed to meet the approval of all present. The objectionable points were the weight, and the style of the cover, some thinking that a box, in all respects like the model, would be unnecessarily heavy, and that the cover would be liable to get loose and let in the dust. These objections, however, were to some extent anticipated by the committee, who had already determined upon some reduction in the thickness of certain parts, and also favored a stronger and wider spring for the cover.

Mr. Gates suggested, in the course of some general remarks on railway economy in the matter of iron and castings, that it would be a great saving to roads, if they would do their own foundry work, and know that good stock went into their castings. It was too much the custom to have such work done at job-shops, the officers concerning themselves more about the price than the quality. He could assure them that this was poor economy, as in the long or short run, they only got what they paid for, and they could not afford to use castings made of poor stock. He would recommend all roads to use the best iron, especially for oil-boxes, and to have them made as light as possible with the requisite strength. All superfluous weight should be dispensed with, as it cost just as much to haul it as if it was essential. After some further remarks by other gentlemen present, the meeting adjourned, and the committee proceeded to determine the pattern of the box to be recommended as a standard.

We can not, of course, by a mere description convey an idea of it in all its details. A drawing would be necessary for this. It resembles in its general features the one in use on the New-York Central and Hudson River Railroad. Several modifications have been introduced, however, which are regarded as improvements. The committee have been careful not to incorporate into its construction any thing which is covered by patent; but to make it so that patented devices for lubricating, or a cover, may be applied as individual roads may prefer.

Mr. Jones was authorized to prepare a pattern of the box as decided upon, with as little delay as possible. As soon as this is done, the pattern will receive a final inspection by the committee, at West-Albany, when the iron patterns will immediately be g. t in readiness for delivery to such parties as may apply for them. To do this, will of course, require several days, we can not say exactly how many, but we hope that those who have adopted the standard axle will be supplied with its essential counterpart early this month at the latest.

The regular monthly meeting for August will be omitted, owing to the warm season and the probability of but a small attendance.

THE record of railroad accidents for the year ending July 1st, as published in the *Railroad Gazette*, is as follows:

	No. of Accidents.	Killed.	Injured.
July	31	35	66
August	63	15	49
September	71	24	104
October	90	29	102
November	103	37	114
December	112	42	133
January	178	40	199
February	133	25	126
March	112	18	92
April	101	23	88
May	79	10	113
June	90	12	104
Totals	1163	310	1290

The Avalanche, a monthly journal published in Philadelphia, and devoted to insurance, railway, and manufacturing interests, has been very much enlarged and improved in appearance, and in the variety of its contents, making it a very useful publication for business men. It is illustrated with numerous well executed engravings. Price $2 a year. Published by R. B. Caverly, 426 Walnut street.

THE *Industrial Age*, of St. Louis, has been consolidated with the *Railway Register*, of that city, the editor of the former having been compelled, in consequence of ill health, to relinquish its publication. The *Register*, in addition to its former specialties, will preserve many of the distinctive features of the *Age* as an organ of the industrial interests of the Southwest.

MESSRS. W. C. ALLISON & SONS, proprietors of the Junction Car-Works and Flue Mill, of Philadelphia, have opened an office in this city, room 59, in the new Drexel Building, corner of Wall and Broad streets.

THE American Institute will hold its forty-second annual exhibition on Third avenue, between Sixty-third and Sixty-fourth streets, New-York, beginning September 10th, and closing November 15th. The buildings on Second avenue will be open for the reception of machinery, August 18th, the other buildings September 1st.

THE mills of A. McDonald & Co., at St. Louis, turn out from 40 to 60 car-axles per day, besides locomotive crank pins and other forgings. About 69 men are employed.

Publishers' Notices.

A JOURNAL-COOLER.—We would call the attention of railroad men to the advertisement, in another column, of Noyes' Liquid Packing for cooling hot journals upon railway-cars. It is claimed that it will cool a journal, no matter how hot it may be, and that it can be done while the car is running, and thus obviate the necessity of detaching a car from a train on this account. The liquid can be applied with entire safety, even when the box is on fire, as it acts as an extinguisher. It is not claimed to be a *durable* lubricant of itself, but when mixed with mineral oil it makes a cheaper and better lubricator than any oil used for that purpose. From the testimonials of several prominent railroads which are using it, its merits seem to be fully indorsed. Railroad men will do well to investigate this preparation, as it must prove invaluable to them if its merits are as stated. The manufacturers have so much faith in it, that they offer to send a barrel to any railroad which desires to try it, and no charge made unless it does all that is claimed for it.

PULSOMETER, OR MAGIC PUMP.—We would direct attention to the advertisement, on page 186, of this invention. Our next issue will contain the cut of a locomotive, illustrating the operation of the pump in supplying the same with water. The proprietors are C. Henry Hall & Co., 20 Cortlandt street.

Facetiæ.

A CINCINNATI drummer, who, with the aid of his feet, filled two seats on the morning train of the Indianapolis, Cincinnati, and Lafayette road, a few days since, and who was too ugly to move, though the car was crowded, was completely upset when the conductor quietly took out his foot-rule, and after deliberately taking the measure of his feet, announced in a loud tone, "Eighteen and three quarter inches!" the great roar of laughter all through the car which followed causing the fellow's feet to come down in a hurry, as he made himself as small as possible in the one seat that he paid for.

FILIAL piety sometimes assumes most affecting forms. A physician, who pays a good deal of attention to anatomy, was presented by his son upon his birthday, recently, with a very interesting corpse, which the devoted child had resurrected from the cemetery the night before. When the father saw it, he sat down upon the piano stool and burst into tears. He said that at last he felt repaid for all the trouble he had had with the boy, for all the nights he had charged around the room with him in his infancy, and for the anxiety with which the father had watched and directed the growth of the child's moral nature.

SMITH had quite a small nose, and was cross-eyed, while Jones had a very large nose. Meeting one day, Jones, after looking with a comical expression at Smith, remarked: "Lucky for you, Smith, that you're cross-eyed, for if you wasn't you could never see your nose." "Lucky for you, Jones," instantly replied Smith, "that you are not cross-eyed, for if you were, you would never see any thing but your nose."

A YOUNG officer of the British House of Commons wore a tremendous pair of mustaches, on which one of the members said: "My dear fellow, the war is over, why don't you put your moustaches on the peace establishment?" "Had you not better put your tongue on the civil list?" was the prompt and happy retort.

THERE is a man in Kentucky who is so fond of money that it is said that, after paying a man a bill, he walks home with him, so as to be near the money as long as possible.

Charcoal Roofing Plates,

Russia Sheet Iron,

AND ALL METALS NECESSARY FOR

Car and Locomotive Works.

A. A. THOMSON & CO.,

213 and 215 WATER STREET,

NEW-YORK.

ALFRED W. LADD,

5 and 7 Dey Street, New-York,

DEALER IN

LOCOMOTIVES

OF EVERY DESCRIPTION.

Palace, Pullman, Passenger, Box, Platform, and Gondolas, and all kinds of Dumping and Construction

RAILROAD CARS,

And all RAILROAD MATERIALS, including

Rails, Fish-Plates, Turn-Tables, Chairs, Chains, Bolts, Nuts, Spikes, etc., etc.

Also dealer in Oak, Chestnut, Virginia Pine, Cypress, Juniper, Cedar, and Hackmatack

RAILROAD TIES,

Florida and Georgia Pine and Oak

CAR TIMBER,

White Pine, Yellow Pine, Hemlock, and other

BRIDGE TIMBER.

Agent for the Best Mills in Florida, Georgia, Pennsylvania, New-York, and Canada.

Highest Premium awarded by the American Institute Fair, 1871.

TRADE MARK. PATENTED.

An Indestructible Coating for Iron, Tin, and Wood.

Prince's Metallic Paint

Is acknowledged, wherever known, to be the

BEST AND CHEAPEST PAINT IN THE MARKET.

N. Y. CENTRAL & HUDSON RIVER R. R. CO. SUPPLY DEP'T,
ALBANY, N. Y., October 25, 1871.

GENTS.: Our Company have used your Metallic Paint for several years. For freight-cars, car-roofs, and buildings it has given us entire satisfaction. Yours, etc.,
M. H. ST. JOHN, Supply Agent.

WASON MANUFACTURING COMPANY,
RAILWAY CARS, CAR WHEELS, AND RAILWAY CASTINGS,
SPRINGFIELD, MASS., October 4, 1871.

GENTS: We have used Prince's Metallic Paint exclusively for several years. If we did not believe it to be the best we would not use it. Yours truly, GEORGE C. FISK, Pres't.

For Sale, Dry and in Oil, by the Trade, and by

PRINCE'S METALLIC PAINT CO.,

MANUFACTURERS,

96 Cedar Street, New-York.

☞ All packages are marked with name and trade-mark.

Send for a Circular.

PHELPS, DODGE & CO.,

Cliff St., between John and Fulton,

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IMPORTERS AND DEALERS IN

Tin and Roofing Plates

OF ALL SIZES AND KINDS.

Pig, Tin, Russia Sheet-Iron, Charcoal and Common Sheet-Iron, Lead, Sheet Zinc, Copper, Spelter, Solder, Antimony, Etc.

MANUFACTURERS OF

Copper, Brass and Wire.

GET THE BEST!

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No. 150 North Third Street,

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SOLE MANUFACTURER OF THE

Half Elastic Varnish Brushes

SUPERIOR TO ANY IN USE.

BRUSHES OF EVERY DESCRIPTION

On Hand, and Made to Order.

SEND FOR CIRCULAR.

Insure against Accidents in the Travelers' Insurance Co., of Hartford, Conn.

Apply to L. F. DINSMORE, Agent, Box 4055, New-York.

C.T.RAYNOLDS & CO'S

SUPERFINE

QUICK

DRYING

COACH COLORS.

ESTABLISHED 1770.

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PREPARED EXPRESSLY FOR THE FINEST DESCRIPTION OF

Car and Locomotive Decoration.

OUR OWN SPECIAL BRANDS OF SUPERIOR RAILWAY VARNISHES,

Are now used by some of the most extensive Railroads in the country, and are particularly recommended.

Car Manufacturers.

Allison, W. C. & Sons.....Philadelphia Pa.
Anderson, J. R. & Co.....Richmond, Va.
Altoona Manufacturing Co.....Altoona, Pa.
Adrian Car Co.....Adrian, Mich.
Arlington Car Manufacturing Co.....Arlington, Vt.
Atlantic Car Works.....Salem, Mass.
Barney & Smith Manufacturing Co.....Dayton, Ohio.
Baker, Jackson & Co.....Latrobe, Pa.
Bellefonte Car Manufacturing Co.....Bellefonte, Pa.
Billmeyer & Smalls.....York, Pa.
Bradley, Osgood.....Worcester, Mass.
Bridgeport Car Works.....Bridgeport, Pa.
Brill, J. G. & Co.....Philadelphia, Pa.
Bitner, George W.....Pittsburg, Pa.
Buffalo Car Co.....Buffalo, N. Y.
Canada Car Co.....Toronto, Canada.
Canada Steam-Engine Co.....Kingston, Canada.
Canda, F. E. & Co.....Chicago, Ill.
Cartersville Car Co.....Cartersville, Ga.
Central Car & Manufacturing Co.....Jackson, Mich.
Clendenning, W. W.....Montreal.
Cummings Car-Works.....Jersey City, N. J.
Connellsville Machine and Car Co.....Connellsville, Pa.
Corunna Car Co.....Corunna, Mich.
De Pere Iron Works.....De Pere, Wis.
Detroit Car Works.....Detroit, Mich.
Detroit Car and Manufacturing Co.....Detroit, Mich.
Dawson Manufacturing Co.....Dawson, Ga.
Dickey, Neill & Co.....Toronto.
Dickson Manufacturing Co.....Scranton, Pa.
Erie Car-Works.....Erie, Pa.
Elmira Car-Works.....Elmira, N. Y.
Frederick & Co.....Catasauqua, Pa.
Freas Brothers & Thornton.....Berwick, Pa.
Fremont Car Co.....Fremont, Ohio.
Gardner, F. & Co.....Carlisle, Pa.
Gill, John L.....Columbus, Ohio.
Gilbert, Bush & Co.....Troy, N. Y.
Goold, James & Co.....Albany, N. Y.
Goodrich Car Co.....Augusta, Ga.
Hannibal Car Works.....Hannibal, Mo.
Haskell & Barker Car Co.....Michigan City, Ind.
Harrisburg Car Manufacturing Co.....Harrisburg, Pa.
Heathcote, Herbst & Co.....Glen Rock, Pa.
Hamilton, William & Son.....Toronto.
Harlan & Hollingsworth Co.....Wilmington, Del.
Huntingdon Car Works.....Huntingdon, Pa.
Indiana Car Co.....Cambridge City, Ind.
Indianapolis Car Co.....Indianapolis, Ind.
Jackson & Sharp Co.....Wilmington, Del.
Jackson & Woodin Manufacturing Co.....Berwick, Pa.
Jones, J. M. & Co.....West-Troy, N. Y.
Kimball Manufacturing Co.....San Francisco, Cal.
Keith, H. T. & I. N.....W. Sandwich, Mass.
Laporte Car Manufacturing Co.....Laporte, Ind.
Lombard, Thomas.....Augusta, Me.
Lebanon Manufacturing Co.....Lebanon, Pa.
Lehigh Car Manufacturing Co.....Stemton, Pa.
Litchfield Car Manufacturing Co.....Litchfield, Ill.
Mansfield Machine Works.....Mansfield, Ohio.
Michigan Car Co.....Detroit, Mich.
McNairy, Claflen & Co.....Cleveland, Ohio
Murray, Dougall & Co.....Milton, Pa.
McVay, Walker & Co.....Braddock's Field, Pa.
Mowry Car and Wheel Works.....Cincinnati, O.
Middletown Car & Manufacturing Co.....Middletown, Pa.
Missouri Car and Foundry Co.....St. Louis, Mo.
New-Haven Car Co.....New-Haven, Ct.
Niblo, James M.....Conshohocken, Pa.
Ohio Falls Car Co.....Jeffersonville, Ind
Ontario Car Co.....London, Ont.
Patten Car Works.....Bath, Maine.
Peabody & Crangle Bro's.....Calais, Me.
Peters, Simon.....Quebec.
Piqua Car and Agricultural Works.....Piqua, Ohio.
Pittsburg and McKeesport Car Co.....McKeesport, Pa
Pittsburg Car and Locomotive Co.....Pittsburg, Pa.
Portland Co.....Portland, Me.
Pullman Car Co.....Chicago.
Peregoy, J. H.....Houston, Texas.
Ranlet Car Manufacturing Co.....Laconia, N. H.
Russell & Co.....Massillon, Ohio.
Sands, William L.....Pottstown, Pa.
Schoharie Machine Co.....Schoharie, N. Y.
Schall, Michael.....York, Pa.
Shaaber & Johnston.....Reading, Pa.
Southern Car-Works.....Independence, La.
South-Western Car Co.....Jeffersonville, Ind.
Shoenberger & Bryant.....Duluth, Minn.
Seath & Hager.....Terre Haute, Ind.
St. Charles Manufacturing Co.....St. Charles, Mo.
Stephenson, John & Co.....New-York, N. Y.
Taunton Car Co.....Taunton, Mass
Tredegar Co.....Richmond, Va.
Tiffin Car-Works.....Tiffin, Ohio.
Vigo Foundry and Terre Haute Car-Works.....Terre Haute, Ind.
Watsontown Car Co.....Watsontown, Pa.
Wharton, Thomas J.....Brunswick, Ga.
Whittaker, Phillips & Co.....Toledo, Ohio.
Wason Manufacturing Co.....Springfield, Mass
Weimer, P. L. & Bros.....Lebanon, Pa.
Wyoming Valley Manufacturing Co.....Wilkesbarre, Pa.
Wells, French & Co.....Chicago, Ill.
Wilmington Car-Works.....Wilmington, Del.

Car-Wheel Manufacturers.

Albany Car-Wheel Works.....Albany, N. Y.
American Paper Car-Wheel Co.....Pittsford, Vt.
Atlantic Iron-Works.....Portsmouth, Va.
Baltimore Car-Wheel Foundry Co.....Baltimore, Md.
Barnum & Richardson Manufacturing Co.....Chicago, Ill.
Barney & Smith Manufacturing Co.....Dayton, Ohio.
Bass & Hanna.....Fort Wayne, Ind.
Bailey, Howson & Co.....St. Paul, Minn.
Blanchard & Arnold.....Milwaukee, Wis.
Boston Car-Wheel Co.....Camb'gep't, Mass.
Bowler, Mayer & Brayton.....Cleveland, Ohio.
Davenport, Fairbairn & Co.....Erie, Pa.
Dawson Manufacturing Co.....Dawson, Ga.
Detroit Car-Wheel Works.....Detroit, Mich.
Fulton Foundry Co.....Cleveland, Ohio.
Gill, John L. Jr.....Allegheny City, Pa.
Green, D. P. & Co.....St. Louis, Mo.
Hamtramck Car-Wheel Works.....Detroit, Mich.
Haskell & Barker Car Co.....Michigan City, Ind.
Harrisburg Car Manufacturing Co.....Harrisburg, Pa.
Heartt, Jonas S. & Co.....Troy, N. Y.
Jackson & Woodin.....Berwick, Pa.
John L. Gill.....Columbus, Ohio.
Lehigh Car-Wheel & Axle Works.....Catasauqua, Pa.
Lobdell Car-Wheel Works.....Wilmington, Del.
London Car-Wheel Co.....London, Can.
Louisville Car-Wheel & Railway Supply Co.....Louisville, Ky.
Middlebrook & Mack.....Oswego, N. Y.
Missouri Car and Foundry Co.....St. Louis, Mo.
Moore Elastic Car-Wheel Co.....Jersey City, N. J.
Mowry Car and Wheel Works.....Cincinnati, Ohio.
Ohio Falls Car Co.....Jeffersonville, Ind.
Pettengill, Glass & Co.....Cleveland, Ohio.
Quealey, W. J.....Hannibal, Mo.
Ramapo Wheel & Foundry Co.....Ramapo, N. Y.
Rutland Foundry & Machine Co.....Rutland, Vt.
Sterling Car-Wheel Foundry.....Columbus, Ohio.
Scoville, J. & N. C.....Buffalo, N. Y.
St. Louis Car-Wheel Co.....St. Louis, Mo.
Taylor Iron Works.....High Bridge, N. J.
Thompson, Duglas.....Bordentown, N. J.
Tredegar Company.....Richmond, Va.
Toronto Car-Wheel Co.....Toronto, Can.
Washburn, Hunts & Co.....Jersey City, N. J.
Washburn Car-Wheel Manufacturing Co.....Worcester, Mass.
Wason Manufacturing Co.....Springfield, Mass.
Whitney A. & Sons.....Philadelphia, Pa.
Woodbury & Company.....E. Cambr'ge, Mass.
Wyoming Valley Manufacturing Co.....Wilkesbarre, Pa.

Locomotive Builders.

Baldwin Locomotive Works.....Philadelphia, Pa.
Brooks Locomotive Works.....Dunkirk, N. Y.
Danforth & Cooke.....Paterson, N. J.
Dawson & Baily (light locomotives).....Connellsville, Pa.
Dickson Manufacturing Co.....Scranton, Pa.
Grant Locomotive Works.....Paterson, N. J.
Hinckley Locomotive Works.....Boston, Mass.
Manchester Locomotive Works.....Manchester, N. H.
Mason, William.....Taunton, Mass.
McKay Iron and Locomotive Works.....Jersey City, N. J.
Portland Company.....Portland, Me.
Porter, Bell & Co. (light locomotives).....Pittsburg, Pa.
Pittsburg Locomotive Works.....Pittsburg, Pa.
Rogers Locomotive Works.....Paterson, N. J.
Rhode Island Locomotive Works.....Providence, R. I.
Schenectady Locomotive Works.....Schenectady, N. Y.
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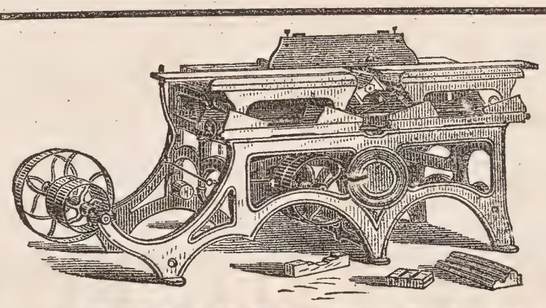

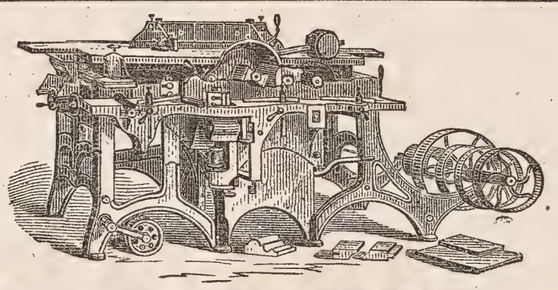

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Atchison & Nebraska	Selah Williams		Atchison, Kan.
Alabama & Chattanooga	S. W. Tozer	S. W. Tozer	Chattanooga, Tenn.
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Atlanta & West-Point	R. D. Cole	R. D. Cole	Newnan, Ga.
Atlantic & Gulf	C. E. Van Vorst	P. N. Raynal	Savannah, Ga.
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Atlantic & Great Western	N. Wright	W. G. Haggard	Cleveland, Ohio.
Atlantic & Great Western	‖J. B. Miller.	S. V. Smith	Kent, Ohio.
Atlantic & Great Western	Allen Cook	J. W. Holmes	Galion, Ohio.
Atlantic & Pacific	§John Hewitt	E. Martin	St. Louis, Mo.
Atlantic, Mississippi & Ohio			
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South-Side of Virginia "	J. T. Robinett	J. T. Robinett	Petersburg, Va.
Virginia & Tennessee "	F. Sterk	W. A. Morgan	Lynchburg, Va.
Virginia & Kentucky "			
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Androscoggin	Ira K. Russell	C. S. Greenwood	Farmington, Maine.
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B			
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Baltimore & Ohio	Wm. Edwards		Martinsburg, Va.
Baltimore & Ohio	A. J. Cromwell		Piedmont, Va.
Baltimore & Ohio	E. W. Lippencott		Grafton, W. Va.
Baltimore & Ohio			Wheeling, W. Va.
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Bangor & Piscataquis	Horace Penny	J. W. Comins	Old Town, Maine.
Bellefonte & Snow Shoe	H. D. Landis	H. D. Landis	Bellefonte, Pa.
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Boston & Albany	A. B. Underhill	W. E. Chamberlain	Allston, Mass.
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Boston & Maine		D. C. Richardson	Lawrence, Mass.
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Boston, Lowell & Nashua		S. A. Davis	Nashua, N. H.
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Burlington & Missouri River	J. Christiansen		Plattsmouth, Neb.
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Buffalo, New-York & Phila	Allen Vail		Buffalo, N. Y.
Buffalo, Corry & Pittsburg	Thomas Connell	Thomas Connell	Corry, Pa.
C			
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California & Pacific	O. R. Ford	D. Rutherford	Vallejo, Cal
Camden & Amboy	F. B. Stevens		Hoboken.
	T. T. Kerr	E. Lockwood	Bordentown, N. J.
	Thomas Single		South-Amboy.
Camden & Atlantic	Rufus Hill	S. Wills	Camden, N. J.
Canada Southern	C. E. Benton	C E. Benton	St. Thomas, Canada.
Carolina Central	W. A. Gill	Thos Myers	Laurinburg, N. C.
Catawissa	A. J. Prescott	C. D. Ellis	Catawissa, Pa
Catasauqua & Fogelsville	Thomas Evans	Chas. J. Holbach	Catasauqua, Pa.
Carrolton & Oneida	M. T. Wiggins		Carrolton, Ohio.
Charleston & Savannah	H. T. Calder		Charleston, S. C.
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Chesapeake & Ohio	§T. J. Hamer		Huntingdon, W. Va.
Cheraw & Darlington	D. W. Haines	A. M. Corrie	Florence, S. C.
Champlain Trans. Co.	H. T. Calder		Burlington, Vt.
Cheshire & Ashuelot	F. A. Perry	A. E. Howard	Keene, N. H.
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Chicago & North-western	§Geo. W. Tilton	Thomas Hull	Chicago, Ill.
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Galena Division		Hugh Gray	Chicago, Ill.
Wiscon. Mad. & Mill. Divis	T. B. Tilton		Chicago, Ill.
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Peninsula Division	S. L Pierce		Escanaba, Mich.
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Chicago, Burlington & Quincy	‡Geo. Chalender		Burlington, Iowa.
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Galesburg Division	Wm. Wilson		Galesburg, Ill.
Quincy Division	Joel West		Quincy, Ill.
Burlington Division	S. E. Burtch		Burlington, Iowa.
Buda Division	P. R. Sutton		Buda, Ill.
Chicago, Cincinnati & Louisville	C. F. Kidder	D. B. Howe	La Porte, Ind.
Chicago, Clinton & Dubuque	P. R. Sutton		Dubuque, Iowa.
Chicago, Dubuque & Minnesota	P. R. Sutton		Dubuque, Iowa.
Chicago, Rock Island & Pacific	T. B. Twombly	B. K. Verbryck	Chicago, Ill.
Chicago & Michigan Lake Shore	Wm. L. Fitch	Oliver Udell	St. Joseph, Mich.
Chicago, Danville & Vincennes	A. B. Bedell	W. H. Dunham,	Momencee, Ill.
Chicago, Danville & Vincennes	J. M. Sanborn		Chicago, Ill.
Chicago, Danville & Vincennes		W. H. Dunham	Danville, Ill.
Chicago & Canada Southern	§§J. Johann		Trenton, Mich.
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Indianapolis Division		R. Attridge	Indianapolis, Ind.
Cincinnati Divison	D. Carmichael		Delaware, Ohio.
Columbus Division	F. G. Kaufholz		Cleveland, Ohio.
Cleveland and Pittsburg	N. E. Chapman	A. Steinbrunner	Cleveland, Ohio.
Cleveland, Mt Vernon & Delaware	J. W. Holloway.	J. W. Holloway	Akron, Ohio.
Cincinnati, Hamilton & Dayton	William Cullen.	W. H. H. Allison.	Cincinnati, Ohio.
Cincinnati & Indianapolis Junction	W. McKinzie	Edwin Beeny	Indianapolis, Ind.
Cincinnati, Lafayette & Chicago	Charles E. Gore		Lafayette, Ind.
Cincinnati & Muskingum Valley	Leroy Kells	Daniel Jewell	Lancaster, Ohio.
Cincinnati, Sandusky & Cleveland	John Y. Beattie	John Y. Beattie	Sandusky, Ohio.
Cobourg, Peterboro & Marmosa	Wm. Polson		Cobourg, Canada.
Columbus, Chicago & Indiana Central	(See Pitts. Cinn. & St. Louis)		
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Concord & Portsmouth	C. L. Eastman	M. W. Dickerman.	Concord, N. H.
Concord & Claremont	J. N. Lander	A. Langmaid	Concord, N. H.
Connecticut River	§Wm. H. Stearns		Springfield, Mass.
Connecticut Valley	C. W. Hollister	N. A. Smith	Hartford, Ct.
Connecticut Western	N. Slingland		Hartford, Ct.
Contoocook River			Concord, N. H.
Conn. & Passumpsic Rivers	Horace Alden	Horace Alden	Lyndon, Vt.
Cumberland Valley	A. S. Hull	C. W. Nitterhouse	Chambersburg, Pa.
Cumberland & Pennsylvania	W. L. Jordan	J W. Sauerbach	Mt. Savage, Md.
Central of Georgia		C. C. Millar.	Savannah, Ga.
Central of New-Jersey	*T. W. Peeples	George Hackett	Elizabethport, N. J.
Lehigh & Susquehanna Div	L. C. Brastow	L. C. Brastow	Wilkesbarre, Pa.
Central Branch Union Pacific	Wm D. Rowley		Atchison, Kansas.
Central R. R. of Iowa	F. B. Woodruff	T. L. Seevers	Marshall, Iowa
Central Pacific	A. J. Stevens	Benjamin Welch	Sacramento, Cal.
D			
Dakota & Southern	Jas. Whitney	A. A. Meckling	Sioux City, Iowa.
Davenport & St. Paul's	George Gregg	George Gregg	Davenport, Iowa.
Dayton & Union	A. J. Keenan	J. F. Feicht.	Dayton, Ohio.
Danbury & Norwalk	Charles A. Craig	C. A. Craig	Danbury, Ct.
Dayton & Michigan	William Cullen	W. H. Allison	Cincinnati, Ohio.
Denver & Rio Grande	John Greenwood		Denver, Col.
Delaware, Lackawanna & Western	Walter Dawson	Robert McKenna	Scranton Pa.
Morris & Essex Division	W. H. Lewis	L S. Barber	Hoboken, N. J.
Des Moines Valley	James Lamb	R. E. Smith	Keokuk, Iowa.
Detroit, Ft. Wayne & Logansport	W. A. Carpenter		Bankers, Mich.
Detroit & Milwaukee	Andrew Wilson		Detroit. Mich.
Detroit, Lansing, & Lake Michigan	Tho. G. Roberts		Detroit, Mich.
Delaware & Hudson Canal Co	James Dickson	Thomas Orchard	Carbondale, Pa.
Rensselaer & Saratoga Div	John Dikeman		Troy, N. Y.
Dorchester & Delaware			Cambridge, Md.
Dubuque South western	I. M. Smith	I M. Smith	Farley, Iowa.
Dutchess & Columbia	W. G. Vanbuskirk	H. A. Webster	Fishkill, N. Y.
Dunkirk, Allegheny Val. & Pittsburg	J. C. Haggett	J. C. Haggett	Dunkirk, N. Y.
E			
Eastern		J. P. Somerby	Salem, Mass.
Eastern	John Thompson		East-Boston, Mass.
Eastern Kentucky	D. L. Weaver	D. L. Weaver	Riverton, Ky.
East-Tennessee & Virginia	Eli Hixon	Jos. Armbruster	Knoxville, Tenn.
East-Tennessee & Georgia	Eli Hixon		Knoxville, Tenn.
East Pennsylvania		Samuel Reeves	Reading, Pa
Elizabethtown and Paducah	W. D. Robb	T. A. Cordrey	Elizabethtown, Ky.
Erie Railway	‖‖M. E. Brown		Susquehanna, N. Y.
Erie Railway	James B. Gregg		Susquehanna, N. Y
Erie Railway	H. L. Brown	C. A. Smith	Jersey City, N. J.
Erie Railway	J. G. Hubbard	M. Wilder	Buffalo, N. Y.
Erie Railway	W. E. Cooper	W. E. Cooper	Hornellsville, N. Y
Erie Railway		W. E. Rutter	Elmira, N. Y
Evansville & Crawfordsville	John L. White	Joseph Stiker	Evansville, Ind.
Evansville, Henderson & Nashville	H. M. Smith	W. H. H. Price	Henderson, Ky.
European & North Am. (of Maine)	A. O. Bailey	J. H. Brown	Oldtown, Maine.
Erie & Pittsburg	G. J. Parkin	G. J. Parkin	Erie, Pa.
Evansville, Terre Haute, & Chicago			Terre Haute, Ind.
F			
Flushing & North Side	Wm. La Suer		College Point, L. I.
Florida	Ezra Gray	G. Hernandez	Fernandina, Fla.
Flint & Pere Marquette	Sanford Keeler	Sanford Keeler	East-Saginaw, Mich.
Fitchburg	Geo. A. Cooledge	Enos Varney	Charlestown, Mass.
Fitchburg & Worcester	John Webster	Samuel Stevens	Fitchburg, Mass.
G			
Galveston, Harrisburg & San Antonio	Jno. G. Coulon		Galveston, Texas.
Gilman, Clinton & Springfield	W. B. McKenna		Springfield, Ill.
Grand Tower & Carbondale	Hugh Smith	Hugh Smith	Grand Tower, Ill.
Grand Trunk		Warren Noyes	Gorham, Me.
Grand Trunk	†Richard Eaton	J. W. W. McWood.	Montreal, Canada.
Grand Trunk		Howard Fry	Sherbrooke, Can.
Grand Trunk		B. J. Mitchell	Portland, Me.
Galveston, Houston & Henderson	Wm. Macbeth	Wm. Macbeth	Galveston, Texas.
Grand Rapids & Indiana	J. M. Boon		Fort Wayne, Ind.
Great Western of Canada	†Wm. A. Robinson	F. Childs	Hamilton, Canada.
Georgia	William Hardman.	T. M. Preval.	Augusta, Ga.
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Greenville & Columbia	J. T. Price	J. T. Price	Helena, S. C.
H			
Harlem Extension	George W. Blanchard		Rutland, Vt.
Harlem Extension		C. S. Clapp	Bennington, Vt.
Hanover Branch	John J. Bingley	Henry Britcher	Hanover, Pa.
Hannibal & St. Joseph	H. A. Towne.	H. C. Whiting	Hannibal, Mo.
Hartford, Providence & Fishkill	Edwin Garfield	V. D. Perry	Hartford, Ct.
Hackensack & New-York	Abra'm Angausen		Hackensack, N. J.
Housatonic	C. R. Morris	J. J. Ferris.	Bridgeport, Ct.
Houston & Texas Central	§W. H. Purdy	W. H. Purdy	Houston, Texas.
Houghton & Ontonagon			L'Anse, Mich.
Houston Tap & Brazoria	T. J. Shellhorn	T. J. Shellhorn	Houston, Texas.
Huntington & Broad-Top Mountain	J. Salisbury	M. Tellerhoof	Saxton, Pa.
Hempfield	T. Marsh		Wheeling, Va.
I			
Indianapolis, Cincinnati & Lafayette	J. S. Patterson	S. Griffith.	Cincinnati, Ohio.
Indianapolis, Peru & Chicago	John McKenna	John McKenna	Peru, Ind.
Illinois Central	**S. J. Hayes.	H. O. Wadlie	Chicago, Ill.
Chicago Division	Henry Schlacks		Chicago, Ill.
South Division	David Oxley		Centralia, Ill.
North Division	J. B. Edams.		Amboy, Ill
Iowa Division	Thomas W. Place		Waterloo, Iowa.
Iowa & Missouri State Line			Farmington, Iowa.
Iron	Perry Scott.	Clem. Roetling	Ironton, Ohio.
Indianapolis & St. Louis	Wm. Barkla	R. B. More	Mattoon, Ill.
Indianapolis, Bloomington & Western	Tho. V. Losee	A. J. Allen	Urbana, Ill.
Ionia & Lansing	H. Loughlin		Lansing, Mich.
Indianapolis & Vincennes	A. E. Allcott		Indianapolis, Ia.
International & Great Northern	T. J. Shellhorn	F. M. Looney	Houston, Texas.
Intercolonial	Wm. Whitney	Edw. Shaffer	Moncton, N. B.
Ithaca & Athens	F. A. Brown		Ithaca, N. Y.
J			
Jeffersonville, Madison & Indiana	Reuben Wells		Jeffersonville, Ind.
Junction & Breakwater	J. A. Maguire		Lewes, Del.
K			
Kansas Central	John Davis		Leavenworth, Kan.
Knox & Lincoln	§§E. R. Hamlin	Benj. Soule	Bath, Maine.
Kentucky Central	J. R. Ledyard	J. L. Hackathorn	Covington, Ky.
Knoxville & Charleston			Knoxville, Tenn.
Kansas Pacific	**L. H. Waugh		Wyandotte, Kansas.
Denver Pacific Div	**L. H. Waugh		Wyandotte, Kansas.
Denver & Boulder Valley Div	**L. H. Waugh		Wyandotte, Kansas.
Junction City & Ft. Kearney Div	**L. H. Waugh		Wyandotte, Kansas.
Arkansas Valley Div	**L. H. Waugh.		Wyandotte, Kansas.
Kalamazoo, Allegan & Grand Rapids			Kalamazoo, Mich.
Kansas City, St. Joseph & Council Bluff	H. L. Cooper	T. Aylesbury	St. Joseph, Mo.
King's Mountain	E. Thomas.	E. Thomas	Chester, S. C.
L			
Lake Erie & Louisville	John Pero		Fremont, Ohio.
Lake Superior & Mississippi	R. B. Small		St. Paul, Minn.
Lackawanna & Bloomsburg	Chas. Graham	Chas. Graham	Kingston, Pa.
Lehigh Valley	John I. Kinsey		South-Easton, Pa.
Lehigh Valley	P. Hofecker	E. R. Brown	Weatherly, Pa.
Lehigh Valley	A. Mitchell	Mauch Chunk, Pa.	Delano, Pa.
Lehigh Valley	D. Clark		Hazleton, Pa.
Leavenworth, Lawrence & Gal	S. M. Philbrick		Lawrence, Kansas.

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Little Rock & Fort Smith	D. R. Wing	D. R. Wing	Argenta, Ark.
Little Miami	J. H. Setchel.		Cincinnati, Ohio.
London & Port Stanley			London, C. W.
Louisville, New-Albany & Chicago	Geo. Ruhlandt	Geo. Helfrich	New-Albany, Ind.
Long Island	Chs. A. Thompson.	Ellis Dodge	Hunter's Point, L I.
Louisville, Cincinnati & Lexington	E B. Gibbs	S. S. Pilson	Louisville, Ky.
Louisville & Nashville	†Thatcher Perkins		Louisville, Ky.
Louisville & Nashville	D. P. Rennie	Isaac M. Owens.	Louisville, Ky.
Louisville & Nashville	Jas. Montgomery		Bowling Green, Ky.
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South & North Ala. Div.	Thos Jeffers	W. L. Gude	Birmingham, Ala.
South & North Ala. Div	C. H. Beale		Montgomery, Ala.
Memphis & Ohio Div.	Thos. Walsh	R. M. C. Parker.	Memphis, Tenn.
Lake Shore & Michigan Southern	‡James Sedgley.	††John Kirby	Cleveland, Ohio
Michigan Southern Division	William Hill		Elkhart, Ind.
" " "		S. S. Knapp.	Adrian, Mich.
Toledo Division	Geo. H. Tier	Frank O. Bray	Norwalk, Ohio.
Erie Division	L. O. Gassett.	J. Withyecombe.	Cleveland Ohio.
Buffalo Division	W. L. Wallace	A. Robson	Buffalo, N. Y.
Lake Shore & Tuscarawas Valley	Charles Fellows.	J. D. McIlwain.	Black River, Ohio.
Lake Ontario Shore	J. C. Schermerhorn.	J. C. Schermerhorn.	Oswego, N. Y.

M

Marquette, Houghton & Ontonagon	A. P. Burroughs.	H. D. Lyons	Marquette, Mich.
Macon & Augusta			Macon, Ga.
Maine Central	J. W. Philbrick.	C. H. Kenison	Waterville, Me.
Macon & Western	D. M. Gogul	James A. Knight.	Macon, Ga.
Manchester & Lawrence	Chas. L. Eastman.	M. W. Dickerman.	Concord, N. H.
Marietta & Pittsburg	W. J. Adams		Marietta, Ohio.
Maryland & Delaware	J. L. Caldwell		Easton, Md.
Macon & Brunswick	M. Thornton	M Thornton	Macon, Ga.
Marietta & Cincinnati	E. Bosley	E. Bosley	Chillicothe. Ohio.
Memphis & Little Rock	Tho. Rennells	P. Twitchell	Argenta, Ark.
Memphis & Charleston	A. Ross	A W. Drew	Memphis. Tenn.
Memphis & Charleston	H. N. Burford	Fabien Varin	Huntsville, Ala.
Mineral Point	Robert Hay		Mineral Point. Wis.
Mississippi & Tennessee	Geo. Hazenger	J. Riny	Memphis, Tenn.
Mississippi Central	Henry Gibbon.	John E. Becton	Water Valley. Miss
Maryland & Delaware	Samuel Peters		Greensboro, Md.
Mississippi, Gains. & Tus			Gainsville, Ala.
Midland Pacific			Nebraska City, Neb.
Milwaukee & Northern		W. I. F. Liddell	De Pere. Wis.
Milwaukee & St. Paul	T. S. Davis	Wm. E. Kittrege.	Milwaukee, Wis.
Milwaukee & St. Paul		John Baillie	Milwaukee, Wis.
Milwaukee & St. Paul	J. Pattee	D. F. Wilson	Minneapolis, Minn.
Hastings & Dakota Division	C. C. Clements		Hastings. Minn.
Michigan Central		J. B. Sutherland.	Detroit, Mich.
Grand River Valley Division		James Potts	Jackson, Mich.
J'kson, Lans'g & Saginaw Div.	Andrew Wilson	Andrew Wilson	Jackson Mich.
Montgomery & West-Point	J. McVey	J T. Daniels	Montgomery, Ala.
Montgomery & Eufaula	I. W. Hewlet	T. J. Burton	Montgomery, Ala.
Mobile & Montgomery	James McFarland.	L. Barham	Montgomery, Ala.
Mobile & Girard	C D Wall		Girard. Ala.
Mobile & Ohio	L. J. Fleming / B. S. Skates	John McHugh / Jacob Hay	Mobile, Ala. / Whistler, Ala.
Missouri River, Fort Scott & Gulf	John S. McCrum		Kansas City, Mo.
Missouri River, Fort Scott & Gulf		Josiah Stahl	Wyandotte. Kan.
Missouri, Kansas & Texas		J. Townsend	Sedalia, Mo.
Missouri, Iowa & Nebraska	Wm. Adams	Geo. Adams	Alexandria, Mo.

N

Nashville & Chattanooga	John U. Eastman.	J. G. Sawyer	Nashville. Tenn.
New-Bedford & Taunton	Robert Chase	Robert Chase	New-Bedford, Mass.
New-Canaan			New Canaan, Ct.
New-Brunswick & Canada	P. O. Logan	T. Armstrong	Fredericton, N. B.
New-Haven & Northampton	Henry Fox	Henry Fox	New-Haven, Ct.
New-York, Kingston & Syracuse	A. Q. Mackenbush.	G. Dikeman	Syracuse, N. Y.
New-York & Harlem.	Wm. M. Strong	Leander Garey	New-York.
New-York Central & Hudson River	‡G. B. Van Vorst		Albany. N. Y.
New-York Central & Hudson River	Henry Watkeys		Syracuse, N. Y.
New-York Central & Hudson River	Amos Gould		Rochester, N. Y.
New-York Central & Hudson River	Jas. Butman	Wm. Johnson	Buffalo, N. Y.
New-York Central & Hudson River	Wm. Buchanan	John McKenna	New-York.
New-York Central & Hudson River			East-Albany, N. Y.
New-York Central & Hudson River		Joseph Jones	West-Albany, N. Y.
New-York Central & Hudson River		George Rowe	Niagara Falls, N.Y.
New-York, Boston & Montreal		H. A. Webster.	Dutchess Junc., N.Y.
New-York & Oswego Midland	§Wm. H. Griggs.	Wm. H. Griggs	Oswego, N. Y.
New-Jersey Division	J. F. Sechler		Wortendyke, N. J.
New-Jersey Division		J. A. Read.	Pompton, N. J.
New-York & New-England	Geo. E. Boyden	Elias E. Pratt	Boston, Mass.
New-York, Providence & Boston.	Jas. H. Anderson.	Jas H. Anderson.	Providence. R. I.
New-York, New-Haven & Hartford	§§H. Kittendorf	James Denver	New-Haven. Ct.
New-York, New-Haven & Hartford	J. O. Chapman	F. Leppens.	Hartford, Ct.
New-Jersey Southern	Rufus Blodgett.		Manchester, N. J.
New-Haven & Derby			New-Haven, Ct.
New-Orleans, Opelousas & Gt. Western.	John McCluskey.	Matthew Nolan	Algiers, La.
New-Lisbon			Leetonia, Ohio.
New-Orleans & Ohio	John R. Jordan	John R. Jordan	Paducah, Ky.
New-Orleans. Jackson & Gt Northern.	N. Greener	N. Greener	New-Orleans, La.
New-Haven, Hartford & Springfield			Hartford. Ct.
Naugatuck	Henry Hanford	George. W. Gray.	Bridgeport, Ct.
North-Carolina	Rufus D. Wade	B. G. Sergeant	Co. Shops. N. C.
North-Louisiana & Texas	C H. Tull		Monroe, La.
New Orleans, Mobile & Texas	J. R. White	D. C. Roland	Mobile, Ala.
Northern Central	C. M. Lewis		Baltimore, Md.
Northern Central		G W. Demarest.	York, Pa.
North Lebanon		Henry B. Oves	Lebanon. Pa.
North Pennsylvania	Franklin Roop.	Franklin Roop	Philadelphia, Pa.
North Eastern	D. W. Haines	A M. Corrie	Florence, S C.
Northern	James W. Lander.	Albert Langmaid.	Concord, N. H.
Northern of New Jersey	T. W Demorest		New-York.
Norwich & Worcester	Richard Colburn.	G. R. Bentley	Norwich, Ct.
Northern of Canada	P. Clark.	P. Clark	Toronto, Can.
Northern Pacific	§§Geo. W. Cushing		St. Paul, Minn.

O

Old Colony & Newport	J. K. Taylor	A. Gleason	Boston, Mass.
Oil City & Pithole	George Thompson		Pithole, Pa.
Oil Creek & Alleghany River	J. S. McElroy	Jacob Williams	Corry, Pa.
Oil Creek & Alleghany	H.J.Bookhammer.	John Monks	Oil City, Pa.
Ohio & Mississippi		G.Hibbard	Cochran, Ind.
East Division	A. Thompson		Cochran. Ind.
West Division	H. Elliott	Chas. Hyatt	East St. Louis, Ill.
Oregon & California	§§J. Brandt.		Portland, Oregon.
Owensburg & Russellville	J. R. Osborne		Owensburg, Ky.

P

Paducah & Memphis	J. D. Linning		Paducah, Ky.
Painesville & Youngstown	G. R. Crane		Painesville, Ohio.
Paris & Decatur	John G. Clifford	G. Clifford	Paris, Ill.
Panama	Chas. E. Stewart.	J. G. Wilson	Aspinwall, N. G.
Pacific of Missouri	§§John Hewitt	John Hewitt	St Louis, Mo.
Pennsylvania	§§F. Thomson		Altoona, Pa.
Pennsylvania	H D. Garrett	I. W. Van Houten.	W. Philadelphia, Pa.
Pennsylvania	E. L Caum	Samuel W. Myers	Harrisburg, Pa.
Pennsylvania	G. W. Strattan	John P. Levan	Altoona, Pa.
Pennsylvania	D. O. Shaver	R. S. Ramsey	Pittsburg, Pa.
New-Jersey Division.	John Headden	David H. Baker.	Jersey City, N. J.
West-Penn. Division	C. B. Street.	James F. Elder	Blairsville, Pa.
Philadelphia and Erie	Martin Walls / W. L Forster / W. L. Holman / W. T. Smith / §§T. N. Ely		Sunbury, Pa. / Renovo, Pa. / Kane. Pa. / Erie, Pa. / Erie, Pa.
Philadelphia, Wilmington & Baltimore	S. A. Hodgman	Wm. T. Worth	Wilmington, Del.
Philadelphia & Reading	L. B. Paxson	Aaron Steinbach.	Reading, Pa.
Germantown & Norris'n Div.	Jackson Richards		Philadelphia, Pa.
Philadelphia & Baltimore Central	S. D. Danfield.	Samuel D. Danfield.	Chester, Pa.
Pittsburgh, Cincinnati & St. Louis			
Pittsburgh & Columbus Division	E. Pierce		Dennison, Ohio.
Pittsburgh & Columbus Division		James McGee	Steubenville. Ohio.
Little Miami Division		M. P. Ford	Columbus, Ohio.
Little Miami Division	J. H. Setchel		Pendleton. Ohio.
Col., Cin. & Ind. Division	Robert Curtis	Tho. Chamberlain	Columbus, Ohio.
Col., Cin. & Ind. Division	Geo. H. Prescott	Geo. H. Prescott	Logansport, Ind.
Peoria & Rock Island	Theo Mosher		Peoria, Ill.
Pittsburg. Fort Wayne & Chicago	S. M. Cummings	John Marquis	Alleghany, Pa.
Pittsburg, Fort Wayne & Chicago	J. M. Boon	J. M. Boon	Fort Wayne. Ind.
Pittsburg, Fort Wayne & Chicago		J. J. Kirkland	Crestline, Ohio.
Pittsburg, Washington & Baltimore	A. S. Kinzie		Connellsville, Pa.
Peoria, Pekin & Jacksonville	R. F. Hurd	Jas. J. Doyl	Pekin, Ill.
Peninsular	T. G. Templeton		Battle Creek, Mich
Portland & Rochester	John G. Brady	John G. Brady	Portland, Me.
Portland & Kennebec	John Ellis	C. H. Kenison	Augusta. Me.
Portland & Oxford Central	Geo. W. Battles.	Geo. W. Battles.	Buckfield, Me.
Portland, Saco & Portsmouth	John Donnell		Portland. Me.
Port Royal	C. W. Furber	E. Hubard	Port Royal, S. C.
Port Hope, Lindsay & Beaverton	H. G. Taylor	H. G. Taylor	Port Hope, Can.
Port Huron & Lake Michigan	R. C. Stewart	R. C. Stewart	Port Huron, Mich.
Providence, Warren & Bristol	Rufus Smith	J. Brightman	Bristol, R. I.
Portsmouth, Gt. Falls & Monmouth	James Tucker	E. Fall	Union Village, N.H.
Petersburg & Weldon	R. B. Andrews	Alex. Wright	Petersburg. Va.
Providence & Worcester	Joseph Kelly	Olney L. Smith	Providence, R. I.
Poughkeepsie & Eastern	John L. Driscoll.	Jerry Wigg	Poughkeepsie, N. Y.

R

Raleigh & Gaston.	J. B. Gayle	J. B. Gayle	Raleigh, N. C.
Richmond, Fredericksburg & Potomac.	H. Kuhn	W. H. Trainham.	Richmond, Va.
Richmond, Danville & Piedmont	John McFarland.	H. Longest	Richmond, Va.
Richmond & Petersburg	John O'Brien	H. L. Carter	Richmond, Va.
Richmond & York River	C. H. Harris	J. L. Thompson.	Richmond. Va.
Rive De Loup	P. A. Logan		Fredericton, N. B.
Rome, Watertown & Ogdensburg	Wm. Jackson	H. H. Sessions	Rome, N. Y.
Reading & Columbia	B. Van Lew		Columbia, Pa.
Rome, Georgia	O. W. Harbin	O. W. Harbin	Rome. Ga.
Rochester & Genesee Valley	M. E. Brown.	M. Wilder	Buffalo, N. Y.
Rockford, Rock Island & St. Louis	Joseph Elder	J. F. Nolte	Beardstown, Ill.

S

Saginaw Valley & St. Louis	W. S. Thompson		Saginaw, Mich.
Southern Pacific of California	J. P. Wilson	F. N. Bellisle	San Francisco, Cal.
St. Croix & Lake Superior			New-York City.
St. Croix & Penobscot	Edward Bolton	A G. Page	Milltown, Me.
St. Lawrence & Ottawa	Calvin Dame.	Calvin Dame.	Prescott. Canada.
St. Louis & Iron Mountain	O. A. Haynes	Oscar Doolittle.	Carondelet, Mo.
St. Joseph & Denver City	E. Sleppy		St. Joseph, Mo.
San Antonio & Mexican Gulf	W. T. Bingham		Victoria, Texas.
South Side of Long Island	Geo. H. Griggs	M. Heitzman	Williamsburg, L. I.
St. Paul & Pacific	J. C. Monroe	T. W. Heathcote.	St. Paul, Minn.
St. Paul & Sioux City		J. W. Lydic	Shakopee, Minn.
St. Louis. Vandalia, T. Haute & Ind.	C. R. Peddle	H. Kirmse	Terre Haute, Ind.
Indianapolis Division	Wm. Riley		Terre Haute, Ind.
Vandalia Division	A. J. Sanborn.		Effingham, Ind.
South-Carolina	W. B. Smith	John Reed	Charleston, S. C.
Southern Central	Chas. G. Brown.	H. Mooney	Auburn, N. Y.
Southern Minnesota	Wm. Lininger		Wells, Minn.
South-Western of Georgia	C. D. Wall		Columbus, Ga.
South-Western of Georgia	D. M.Gogul	James A. Knight.	Macon. Ga.
South Shore	Warren E Ray		Cohasset. Mass.
Stanstead, Shefford & Chambly	W. H. Smith		Waterloo. C. E.
Seaboard & Roanoke	§E. G. Ghio	J. B. Pendleton	Portsmouth, Va.
Stonington & Providence	J. H. Anderson.	J. H. Anderson.	Providence, R. I.
Selma & Gulf	Wm. T. Daughtrey.		Selma, Ala.
Selma, Rome & Dalton	A. G. Maynes.	W W. Peirce	Selma. Ala.
Sioux City & Pacific	C. H. Foster		Missouri Val., Iowa.
Spartanburg & Union	J. N. Benner	Jacob Rice	Union C. H., S. C.
Sheboygan & Fond du Lac	A. F. Wallace.	A. F. Wallace.	Sheboygan. Wis.
Sullivan & Erie			Tonawanda. Pa.
Syracuse, Binghamton & New-York	H. H. Dawson	David Burling	Syracuse, N. Y.
Syracuse Northern	W. Garrison	L. W. Smith	Syracuse, N. Y.
Sycamore & Cortland			Sycamore, Ill.
St. Louis, Alton & Terre Haute.	**Beriah Warren		St. Louis, Mo.
St. Louis & South-Eastern	L. B. Salisbury		Mt. Vernon. Ill.
Nashville Division	H. M. Smith	W. H. H. Price	Nashville, Tenn.
St. Louis, Kansas City & Northern.	H. S. Smith	C. S. Buck	Moberly, Mo.

T

Taunton Branch.	W. M. Parks	J. G. Codding	Taunton. Mass.
Tioga	Peres Bonny	D. H. Stratton	Blossburg. Pa
Texas & New-Orleans	R. B. Baer		Houston, Texas.
Tennessee & Pacific.	William McKeand.	William McKeand.	Nashville, Tenn.
Toledo, Wabash & Western	W. F. Ray		Fort Wayne. Ind.
Toledo. Wabash & Western		David Hoit	Toledo. Ohio.
Toledo, Wabash & Western	T. G. Gorman		Springfield, Ill.
Toledo, Peoria & Warsaw	A. H. De Clerq	R. M. Hemphill	Peoria. Ill.
Troy & Boston	Foster Church	R. V. Coon	Troy, N. Y.
Toronto, Grey & Bruce.		Wm. Bowstead	Toronto, Can.
Toronto & Nipissing	J. Haggus		Toronto, Canada.

U

Union Pacific	§I. H. Congdon	Geo. E. Stevens	Omaha, Nebraska.
Utah Central	Thos. Pierpont	Edward Cox	Salt Lake City.
Utica & Black River	Wm. E. Granger	David James	Utica, N. Y.
Utica, Chenango & Susquehanna	C. H. Brown		Utica, N. Y.

V

Vicksburg & Brunswick	James Boon	J. A. Knight	Eufaula, Ala.
Vicksburg & Meridian	Jas. B. Browne		Vicksburg, Miss.
Vineland			Vineland, N. J.
Vermont Central	J. M. Foss	J. M. Foss	St. Albans, Vt.
Rutland Division	N. L. Davis		Rutland. Vt.
New-London Northern Division	J. W. Dow	S. W. Caulkins	New-London, Ct.
Ogdensburg & L. Champlain Div.	William A. Short.	J. R. Ames	Malone, N. Y.
Vermont & Massachusetts	D. T. Davis	Jacob Marsh	Fitchburg, Mass.

W

Wash. City, Va. Midland & Gr. Southern			Alexandria, Va.
Western Union	John Taylor	E. A. Eddy	Racine, Wis.
Wicomico & Pocomoke			Berlin, Md.
Wilmington, Columbia & Augusta	George Hall	W. J. Calais	Wilmington, N. C.
Westchester & Philadelphia	John Moyer	N. Pawling	Philadelphia. Pa.
Wilmington & Weldon	John Bissit	John Bissit	Wilmington, N. C.
Wilmington & Western			Wilmington, Del.
Wilmington & Reading	J. T. Van Horn		Coatesville, Pa.
West-Jersey	W. McAllister	C. C. Williams	Camden, N. J.
Western Maryland	Wm. Cannan	J. H. Nussear	Union Bridge, Md.
Winona & St. Peter	F. C. Ford	H. L. Preston	Winona, Minn.
Western North-Carolina	J. D Hollister		Salisbury, N. C.
Western R. R. N. C	M. W. Atkinson	M. W Atkinson	Fayetteville, N. C.
West-Feliciana	R. C. Brower	Wm. Grawling	Woodville, Miss.
Western & Atlantic	John H. Flynn	Wm. Grambling	Atlanta, Ga.
Worcester & Nashua	Albert Griggs.	Albert Griggs	Worcester, Mass.
Welland	James Taylor	James Chase	St Catharine, C. W.
Washington & Ohio	Edward Dunn	Joshua Harrison	Alexandria. Va.
White Water Valley	A. W. Britton		Harrison, Ohio.

DIRECTORY

OF

Railway Superintendents and Purchasing Agents

THROUGHOUT THE UNITED STATES AND CANADA.

REFERENCES.—* General Manager. † Managing Director.

A

Railroad.	*Superintendent.*	*Purchasing Agent.*	*Residence.*
Arkansas Central	James E. Gregg		Helena, Ark.
Alabama Central	John M. Bridges		Montgomery, Ala.
Albany & Susquehanna	*C. F. Young	D. W. C. Ramsey.	Albany, N. Y.
Alexandria & Fredericksburg	E. L. Dubarry		Washington, D. C.
Atchison, Topeka & Santa Fe	G. H. Nettleton	G. H. Nettleton	Topeka, Kansas.
Atchison & Nebraska	C. C. Smith	C. C. Smith	Atchison, Kansas.
Alabama & Chattanooga	Chas. L. Fitch	J. C. Stanton, Jr.	Chattanooga, Tenn.
Ashtabula, Youngstown & Pittsburg	J. D. Layng		Pittsburg, Pa.
Atlanta & Richmond Air Line	R. Y. Sage		Atlanta, Ga.
Atlanta & West-Point	L. P. Grant		Atlanta, Ga.
Atlantic & Gulf	H. S. Haines		Savannah, Ga.
Atlantic & North-Carolina	E. G. Stanley		New-Berne, N. C.
Atlantic & Great-Western	I. D. Barton	R. B. Browne	Meadville, Pa.
First and Second Division	A. L. Dunbar	"	"
Third and Fourth "	T. A. Phillips		Galion, Ohio.
Mahoning Division	J. M. Ferris		Cleveland, Ohio.
Atlantic & Pacific	A. A. Talmage	W. H. Patriarche.	St. Louis, Mo.
Atlantic, Mississippi & Ohio	Henry Fink		Lynchburg, Va.
Atlantic, Tennessee & Ohio	J. J. Gormly		Charlotte, N. C.
Allegheny Valley	J. J. Lawrence	J. J. Lawrence	Pittsburg, Pa.
Adirondack	C. H. Ballard		Saratoga, N. Y.

B

Baltimore & Ohio	Thos. L. Sharp	Benj. Williams	Baltimore, Md.
Central Ohio & Lake Erie Div.	W. C. Quincy		Columbus, Ohio.
Baltimore & Potomac	J N. Dubarry		Baltimore. Md.
Bangor & Piscataquis	M. H. Angel	L. H Eaton	Bangor, Maine.
Boston & Albany	C. O. Russell		Springfield, Mass.
Boston & Providence	A. A. Folsom	A. A. Folsom	Boston, Mass.
Boston, Clinton & Fitchburg	H. A. Blood		Fitchburg, Mass.
Boston, Concord & Montreal	J. A Dodge	Lyon & Vose	Boston, Mass.
Boston & Maine	William Merritt	M. E. Wood	Boston, Mass.
Boston, Lowell & Nashua	J. B. Winslow		Boston, Mass.
Blossburg, Corning & Tioga	A. H. Gorton	R. J. Burnham	Watkins, N. Y.
Brockville & Ottawa	H. Abbott		Brockville, Canada.
Burlington & Missouri River (in Neb.)	C. F. Morse	C. F. Morse	Plattsmouth, Neb.
Burlington, Cedar Rapids & Minnesota	William Greene	S. L. Dows	Cedar Rapids, Ia.
Burlington & South-Western	R. T. Hosford		Burlington, Iowa.
Buffalo & Jamestown	P. C. Doyle		Buffalo, N. Y.
Buffalo, New-York & Philadelphia	J. D. Yeomans		Buffalo, N. Y.
Buffalo, Corry & Pittsburg	H. H. Potter	N. M. Whitside	Corry, Pa.

C

Cairo & Fulton	Thos. Allen		St. Louis, Mo.
Cairo & Vincennes	John Lee, Jr		Cairo, Ill.
Camden & Atlantic	E. Collings		Camden, N. J.
Carolina Central	S. L. Fremont		Wilmington, N. C.
Catasauqua & Fogelsville	C. W. Chapman	C. W. Chapman	Catasauqua, Pa.
Central Pacific	A. N. Towne	J. R. Watson	Sacramento, Cal.
Central of Georgia	Wm. Rogers	H. Yonge	Savannah, Ga.
Central of Iowa	D. N. Pickering		Marshalltown, Ia.
Central Raiload of New-Jersey	R. E. Ricker	W. S Holden	Elizabeth, N. J.
Chesapeake & Ohio	A. H. Perry	J. A. Netherland	Richmond, Va.
Charlotte, Columbia & Augusta	James Anderson		Columbia, S. C.
Chicago & North-Western	Marvin Hughitt	R. W. Hamer	Chicago, Ill.
Wisconsin & Mill. Division	Arthur A. Hobert		Chicago, Ill.
Peninsula Division	S. C. Baldwin		Escanaba, Mich.
Madison Division	J. H. Stewart		Madison, Wis.
Kenosha Division	A. A. Hobart		Madison, Wis.
Galena Division	Edward J. Cuyler		Chicago, Ill.
Eastern Iowa Division	John B. Watkins		Clinton, Iowa.
Western Iowa Division	John A. Head		Boone, Iowa.
Chicago & Alton	J. C. McMullen	A. V. Hartwell	Chicago, Ill.
Chicago, Burlington & Quincy	R. Harris	H. J. Higgins	Chicago, Ill.
Eastern and Middle Division	C. H. Chappel		Aurora, Ill.
Galesburg Division	H. Hitchcock		Galesburg, Ill.
Quincy Division	N. D. Munson		Quincy, Ill.
Chicago, Dubuque & Minnesota	C. H. Hudson	F. T. Massey	Dubuque, Iowa.
Chicago & Iowa	C. B. Hinkley		Chicago, Ill.
Chicago & Pacific	R. C. Tate		Chicago, Ill.
Chicago, Rock Island & Pacific	Hugh Riddle.	A. Manvel	Chicago, Ill.
Illinois Division			Chicago, Ill.
Iowa Division	A. Kimball		Davenport, Iowa.
Chicago & Michigan Lake Shore	A. H. Morrison	Wm. R. Morrison	St. Joseph, Mich.
Chicago, Danville & Vincennes	J. E. Young	C. B. Mansfield	Chicago, Ill.
Chicago, Pekin & Southwestern	N. J. T. Dana		Streator, Ill.
Cleveland, Columbus, Cincinnati & Ind.	E. S. Flint		Cleveland, Ohio.
Indianapolis Division	C. C. Gale	A. G. Wright	Indianapolis, Ind.
Columbus Division	Robert Blee		Cleveland, Ohio.
Cincinnati Division.	R. H. Shoemaker		Cincinnati, Ohio.
Cleveland & Pittsburg	*J. N. McCullough		Pittsburg, Pa.
Cleveland, Mt. Vernon & Delaware.	G. A. Jones		Akron, Ohio.
Cincinnati & Martinsville	T. C. Burnside		Franklin, Ind.
Cincinnati & Terre Haute	Matt. P. Wood	Matt. P. Wood	Terre Haute, Ind.
Cin., Cumberland Gap & Charleston	W. J. Taylor		Knoxville, Tenn.
Cincinnati, Hamilton & Dayton	Q. Williams	P. Hickey	Cincinnati, Ohio.
Cincinnati & Indianapolis Junction	M. M. Martin		Indianapolis, Ind.
Cincinnati, Lafayette & Chicago	E. H. Waldron	J. W. Haight	Lafayette, Ind.
Cincinnati, Sandusky & Cleveland		J. C. Buxton	Sandusky, Ohio.
Colorado Central	T. E. Sickles		Golden, Col.
Columbus & Hocking Valley	J. W. Doherty	J. W. Doherty	Columbus, Ohio.
Concord & Claremont	George E. Todd		Concord, N. H.
Concord	H.E.Chamberlin.	H. E. Chamberlin.	Concord, N. H.
Connecticut River	John Mulligan	John Mulligan.	Springfield, Mass.
Connecticut & Passumpsic Rivers	Wm. M. Parker		Lyndonville, Vt.
Connecticut Valley	Hiram Fowler		Hartford, Ct.
Connecticut Western	W. H. Yeomans		Hartford, Ct.
Corning & Tioga	L. H Shattuck		Blossburg, Pa.
Cumberland Valley	I. F. Boyd	I. F. Boyd	Chambersburg, Pa.

D

Danbury & Norwalk	John W. Bacon		Danbury, Ct.
Dakota Southern	J. S. Meckling	J. S. Meckling	Sioux City, Iowa.
Davenport & St. Paul	N. H. Wood		Urbana, Ill.
Dayton & Michigan	J. H. Weller		Dayton, Ohio.
Dayton & Union	C. C. Gale		Indianapolis, Ind.
Delaware	H. F. Kenney		Philadelphia, Pa.
Delaware & Hudson	R. Manville		Carbondale, Pa.
Delaware, Lackawanna & Western	W. F. Halstead	G. W. B. Cushing	Scranton, Pa.
Morris & Essex Division	Andrew Reasmer.	G. W. Bleashing.	Hoboken, N. J.
Oswego and Syracuse Division	W. B. Phelps		Oswego, N. Y.
Utica, Chenango & Sus. "	George F. Thompson		Utica, N. Y.
Denver & Rio Grande	W. W. Borst	W. S. Jackson	Denver, Col.
Des Moines Valley	John Givin	G. E. Kilbourne.	Keokuk, Iowa.
Detroit & Bay City	A. H. Reese		Detroit, Mich.
Detroit and Milwaukee	Andrew Watson	John S Lorimer.	" "
Detroit, Hillsdale & Indiana	W. A. Ernst	W. F. Parker	" "
Detroit, Eel River & Illinois	A. B. Southard		Denver, Ind.
Detroit, Lansing & Lake Michigan	A. H. Reese		Detroit, Mich.
Dorchester & Delaware	D. Stewart Hessey		Cambridge. Md.
Dunkirk, Alleghany Valley & Pittsburg	D. Thayer.	C. V. DeForest	New-York City.
Dubuque & South-Western	J. P. Farley		Dubuque Iowa.

E

East Tennessee, Virginia & Georgia	Joseph Jaques		Knoxville, Tenn.
Eastern (Mass.)	J. Prescott	C. W. Pratt	Boston, Mass.
Elizabethtown & Paducah	D. Brock	D. Brock	Elizabethtown, Ky.
Erie	H. D V. Pratt	L. L. Lockwood	New-York, N.Y.
Eastern & Delaware Division	G. S. Redington		Port Jervis, N. Y.
Susquehanna & Rochester "	C. W. Gardner		Elmira, N. Y.
Western & Buffalo "	R. G. Taylor		Buffalo. N. Y.
European & North-American	M. H. Angel	M. H. Angell	Bangor, Maine.
Erie & Pittsburg	John M. Kimball.	Wm. Mullins	Erie, Pa.
Evansville & Crawfordsville	L. Pearson		Evansville, Ind.
Evansville, Terre Haute & Chicago	Jos. Collett, jr.		Terre Haute, Ind.

F

Fitchburg	Chas.L.Haywood.	John Adams.	Boston, Mass.
Flint & Pere Marquette	G. C. Kimball	G. C. Kimball	East-Saginaw, Mich.
Flushing & North-Side	R. D. Tucker		Hunter's Point, L.I.
Fort Wayne, Jackson & Saginaw	W. A. Ernst	Wm. F. Parker	Jackson, Mich.
Fort Wayne, Muncie & Cin	W. W. Worthington		Fort Wayne, Ind.

G

Galveston, Harrisburg & San Antonio	Geo. B. Nichols	J. W. Pierce	Galveston, Texas.
Galveston, Houston & Henderson	George B. Nichols.		Galveston, Texas.
Georgia	S. K. Johnson		Augusta, Ga.
Gilman, Clinton & Springfield	S. H. Melvin		Springfield, Ill.
Grand Rapids & Indiana	*C. E. Gorham		Fort Wayne, Ind.
S. Division	J. M. Matheany		Fort Wayne, Ind.
N. Division	H. D. Wallen, jr		Grand Rapids, Mich.
Grand Rapids & Indiana		William Mullins.	Pittsburg, Pa.
Grand Trunk	C. J. Brydges	John Taylor	Montreal, Canada.
East Division	Henry Bailey		
West Division	W. J. Spicer		
Grand Tower and Carbondale	H. V. Olyphant.	Wm. W. Harris.	Grand Tower, Ill.
Great Western (Canada)	William K. Muir.	Robert Beatty	Hamilton, Canada
Green Bay & Lake Pepin	D. N. Kelly		New-York City.
Greenville & Columbia	Thomas Dodamead		Columbia, S. C.

H

Hannibal & St. Joseph	O. S. Lyford		Hannibal, Mo.
Hartford, Providence & Fishkill	Samuel Nott		Hartford, Ct.
Housatonic	H. W. Franklin		Bridgeport, Ct.
Houston & Texas Central	J. Durand	W. M. Rice, N.Y.	Houston, Texas.
Southern Division	W. H. Vaughan		Houston, Texas.
Northern Division	M. R. Baldwin		Corsicana, Texas.
Huntingdon & Broad Top	J. McKillips	B. A. Knight	Huntingdon, Pa.

I

Illinois Central	A. Mitchell	O. Ott	Chicago, Ill.
Chicago Division	C. A. Beck		Centralia, Ill.
Northern Division	J. C. Jacobs		Amboy, Ill.
Iowa Division	D. W. Parker		Dubuque, Iowa.
Illinois & St. Louis	W. K. McComas		St Louis, Mo.
Indianapolis, Bloomington & Western	J. E. Gimperling		Urbana, Ill.
Indianapolis, Cincinnati & Lafayette	George L. Barringer.		Cincinnati, Ohio.
Indianapolis & Vincennes	E. W. McKenna		Indianapolis, Ind.
Indianapolis & Vincennes		Wm. Mullins	Pittsburg, Pa.
Indianapolis & St. Louis	S. Woodward	J. W. Morse	St. Louis, Mo.
Indianapolis, Peru & Chicago	A. B. Southard	D. Macy.	Indianapolis, Ind.
Michigan City Division	E. C. Murphy		La Porte, Ind.
Intercolonial Railway	Lewis Carvell		Moncton, N. B.
International & Houston & Gt. Northern	H. M. Hoxie		Houston, Texas.
Iowa Midland	J. B. Watkins		Clinton, Iowa.

J

Jacksonville, North-Western & S. E.	E. S. Greenleaf		Jacksonville, Ill.
Jacksonville, Pensacola & Mobile	James M. Baker		Jacksonville, Fla.
Jefferson, Madison & Indianapolis	Horace Scott	Wm. Mullins	Louisville, Ky.
Junction & Breakwater	John A. Sheaff		Lewis, Del.

K

Kansas Central	A. E. Buchanan.		Leavenworth, Kan.
Kansas City, St. Joseph & Council Bluffs	J. F. Barnard		Detroit, Mich.
Kansas Pacific	Edward S. Bowen		Kansas City, Mo.
Kansas Pacific		J. L. Woods	St. Louis, Mo.
Kaw Valley Division	George Noble		Lawrence, Kansas.
Smoky Hill Division	O. H. Dorrance		Ellis, Kansas.
Denver Division	C. W. Fisher		Denver, Col.
Kentucky Central	G. H. Pendleton	Geo. P. Bowler	Covington, Ky.
Knox & Lincoln	C. A. Combs	Oliver Morse	Bath, Maine.

L

Lackawanna & Bloomsburg	D. T. Bound	G.W. B.Cushing.	Kingston, Pa.
Lake Erie & Louisville	I. H. Burgoon		Fremont, Ohio.
Lake Ontario Shore	E. A. Van Horne		Oswego, N. Y.
Lake Shore & Tuscarawas Valley	W. W. Card		Cleveland, Ohio.
Lake Shore & Michigan Southern	Charles Paine	A. C. Armstrong.	Cleveland, Ohio.
Kalamazoo Division	William Wheaton		Kalamazoo, Mich.
Detroit Division			
Lansing Division			
Leavenworth, Lawrence & Galveston	Chas. B. Peck	E. O. Foote, jr.	Lawrence, Kan.
Lawrence & South-Western	R. B. Gemmell	R. B. Gemmell.	Lawrence, Kan.
Lehigh Valley	Robert H. Sayre		Bethlehem, Pa.
	L. Chamberlin		Philadelphia, Pa.
Beaver Meadow Division	A. G. Brodhead, jr		Mauch Chunk, Pa.
Mahony Division	James I. Blakslee		Mauch Chunk, Pa
Wyoming Division	A. Mitchell		Wilkesbarre, Pa.
Little Rock & Fort Smith	S. B. Beaumont.		Little Rock, Ark.
Logansport, Crawfordsville & S. W.	E. C. Dawes		Cincinnati, Ohio.
Long Island	Jno. B. Morford	Oliver Charlick	Hunter's Point, L. I.
Louisville & Nashville & G. Southern	Albert Fink	G. C. Breed	Louisville, Ky.
Clarksville Division	Robert Meek		Clarksville, Tenn.
Memphis Division	J. T. Flynn.		Memphis, Tenn.
Nashville & Decatur Division	D. F. Whitcomb		Nashville, Tenn.
Louisville, Cin. & Lexington	George Skinner	Geo. Skinner	Louisville, Ky.
Louisville, New-Albany & Chicago	M. Sloat	J. R. Parker	New-Albany, Ind.

M

Macon & Brunswick	William McRae	Solomon Hass	Macon, Ga.
Maine Central	L. L Lincoln	G. A. Phillips	Augusta, Me.
Androscoggin Division	A. Brown.		Lewiston, Me.
Manchester & Lawrence	H. E. Chamberlin		Concord, N. H.
Marietta & Cincinnati	W. W. Peabody		Cincinnati, Ohio.
Marietta & Pittsburg	A. J. Warner	R. B. Hoover	Marietta, Ohio.
Marquette, Houghton & Ontonagon	D. H. Merritt	C. E. Van Cleve	Marquette, Mich.
Maryland & Delaware	J. L. Caldwell	J. L. Caldwell	Easton, Md.
Memphis, Carthage & North-Western	George A. Burt		Carthage, Mo.
Memphis & Little Rock	A. S. Livermore		Memphis, Tenn.
Memphis & Charleston	W. J. Ross		Memphis, Tenn.

Railroad.	*Superintendent.*	*Purchasing Agent.*	*Residence.*
Michigan Central	H. E. Sargent		Chicago, Ill.
Michigan Central		John Newell	Detroit, Mich.
Grand River Valley Division	Charles B. Bush		Grand Rapids, Mich.
Jackson, Lansing & Saginaw Div.	Geo. C. Hopper		Saginaw City, Mich.
South-Haven Division	Geo. E. Curtiss		Kalamazoo, Mich.
Joliet Division	Carlton Wheeler		Joliet, Mich.
South-Bend Division			
Michigan Lake Shore	Chas. E. Gorham		Fort Wayne, Ind.
Michigan Lake Shore	P. S. O'Rourke		Monteith, Mich.
Midland Railway of Canada	H. G. Taylor		Port Hope, Ont.
Midland Pacific	J. N. Converse		Lincoln, Neb.
Milwaukee & Northern	J. W. Crippin		Milwaukee, Wis.
Milwaukee, Lake Shore & Western	W. Elwell		Sheboygan. Wis.
Western Division	J. S. Buck		Appleton, Wis.
Milwaukee & St. Paul	S S. Merrill		Milwaukee, Wis.
Mineral Point	G. W. Cobb		Mineral Point, Wis.
Mississippi Central	R. N. Colquhoun		Water Valley, Miss.
Mississippi Central		A. S. Roberts	New-Orleans, La.
Mississippi & Tennessee	M. Burke	M. Burk	Memphis, Tenn.
Mississippi Valley & Western	E. P. Buell		Quincy, Ill.
Missouri, Iowa & Nebraska	Col. Henry Hill		Warsaw, Ill.
Missouri, Kansas & Texas	W. R. Woodward	G. M. Babcock	Sedalia, Mo.
Cherokee Division	W. H. Adams		Chetopa, Kansas.
Choctaw Division	S. G. Eddy		Holden, Mo.
Eastern Division	Mark M. Towne		Hannibal, Mo.
Sedalia Division	J. J. Frey		Sedalia. Mo.
Neosho Division	L. S. Hamilton		Neosho Falls, Kan.
Missouri Pacific	A. A. Talmage	W. H. Patriarche	St. Louis, Mo.
Missouri River, Fort Scott & Gulf	B. S. Heaning	Allen Bowen	Kansas City, Mo.
Mobile & Ohio	L. J. Fleming	C. E. Rushing	Mobile, Ala.
	Cecil Fleming		Mobile, Ala.
	E. S. Hosford		Macon, Miss.
	M. M. Miller		Jackson, Tenn
Mobile & Girard	W. L. Clark		Columbus, Ga.
Mobile & Montgomery	G. Jordon	G. Jordon	Montgomery, Ala.
Montgomery & Eufaula	B. Dunham	B. Dunham	Montgomery, Ala.
Morgan's Louisiana & Texas		C. A. Whitney & Co.	New-Orleans, La.

N

Nashville, Chattanooga & St. Louis	J. W. Thomas		Nashville, Tenn.
Naugatuck	G. W. Beach		Bridgeport, Ct.
New-Brunswick & Canada	J. P. Crangle	Thomas Williams	St. Stephen, N. B.
New-Bedford & Taunton	Warren Ladd		New-Bedford, Mass.
New-Haven & Northampton	C. N. Yeamans	C. N. Yeamans	New-Haven, Ct.
New-Haven, Middletown & Willimantic	W. A. Waterbury	W. A. Waterbury	Middletown, Ct
New-Jersey Southern	M. W. Serat		Long Branch, N. J.
New-Orleans & Selma	T. H. DuPuy		Selma, Ala.
New-Orleans, Jackson & Great Northern	L. H. Sellars	A. S. Roberts	New-Orleans, La.
New-Orleans, Mobile & Texas	S. N. Scranton		New-Orleans, La.
New-York & Harlem	Chas. M. Bissell	R. C. Moore	New-York, N. Y.
New-York, New-Haven & Hartford	E. M. Reed	R. N. Dowd	New Haven, Ct.
N. Y. & N H. Division	John T. Moody		New-York, N. Y.
Hartford Division	C. S. Davidson		Hartford, Ct.
Shore Line Division	W. M. Wilcox		New-Haven, Ct.
New-York, Boston & Montreal	C. L. Kimball		Dutchess Jn., N. Y.
New-York Central & Hudson River	J. Tillinghast	C. V. DeForest	Albany, N. Y.
Eastern Di ision	Zenas C. Priest		Utica, N. Y.
Syracuse & Rochester Division	W. G. Lapham		Syracuse, N. Y.
Buffalo & R ochester Division	M. W. Torrence		Buffalo, N. Y.
New-York & New-England	H. A. G. Pomeroy		Boston, Mass.
Worcester Division	P. St. M Andrews		Worcester, Mass.
New-York & Oswego Midland	C. W. Douglas	P. Bundy	Jersey City, N. J.
Northern Division	W. P. McKinley		Oswego, N. Y.
New-York, Kingston & Syracuse	H. P. Breed		Rondout, N. Y.
Northern Pacific	*C. W. Mead		Brainerd, Minn.
Minnesota Division	J. H. Sullivan		Duluth, Minn.
Lake Superior & Miss. Division	W. W. Hungerford		St. Paul, Minn.
North-Louisiana & Texas	J. W. Green		Monroe, La.
North-Pennsylvania	S. W. Roberts	F. A. Cornby	Philadelphia, Pa.
Northern Canada	†F. W. Cumberland		Toronto, Can.
Northern Central			Harrisburg, Pa.
Northern (New-Hampshire)	George E. Todd		Concord, N. H.
North-Eastern (South-Carolina)	S. S. Solomon		Charleston, S. C.

O

Ohio & Mississippi	E. L. Ryder		Cincinnati, Ohio.
Oil Creek & Alleghany River	J. J. Lawrence		Pittsburg, Pa.
Old Colony	J. R. Kendrick		Boston, Mass.
Omaha & North-Western	R. R. Cable		Rock Island, Ill.
Oregon & California	H. Thielson	G. W. Weidler	Portland, Oregon.

P

Paducah & Memphis	J. W. Wilber		Paducah, Ky.
Paris & Danville	B. F. Matthius		Danville, Ill.
Paris & Decatur	F. C. Stratton	P. Campbell	Paris, Ill.
Peninsula	C. F. Miller		Battle Creek, Mich.
Pennsylvania	* A. J. Cassatt	Enoch Lewis	Philadelphia, Pa.
New-York Division	F. W. Jackson		Jersey City, N. J.
Amboy Division	Isaac S. Buckalew		Trenton, N. J.
Belvidere Division	J. A. Anderson		Lambertville, N.J.
Western Pennsylvania Division	Robert Neilson		Blairsville, Pa.
Lewiston Division	Persifer F. Smith		Lewiston, Pa.
Bedford Division	Wm. H. Brower		Bedford, Pa.
Pensacola & Louisville	Daniel H. Cram		Pensacola, Fla.
Peoria & Rock Island	John R. Hilliard		Peoria, Ill.
Peoria, Pekin & Jacksonville	James F. Kelsey		Pekin, Ill.
Petersburg	* Jas. C. Sprigg	D. R. Dunn	Petersburg, Va.
Philadelphia & Reading	J. E. Wootten	W. S. Wilson	Reading, Pa.
Catawissa & Williamsport Br'ch	George Webb		Williamsport, Pa.
Reading & Columbia	B. Van Lew		Columbia, Pa.
Lebanon & Tremont	H. W. Tracy		Pine Grove, Pa.
Philadelphia and Baltimore Central	Henry Wood	Henry Wood	Philadelphia, Pa.
Philadelphia & Erie	W. A. Baldwin	E. Lewis	Erie, Pa.
Western Division	J. W. Reynolds		Erie, Pa.
Middle Division	Edmund L. Tyler		Renovo, Pa.
Eastern Division	Thomas Gucker		Williamsport, Pa.
Philadelphia, Wilmington & Baltimore	H. F. Kenney		Philadelphia, Pa.
Pithole Valley	J. T. Blair		Pithole City, Pa.
Pittsburg, Cincinnati & St. Louis	*J. N. McCullough	Wm. Mullins	Pittsburg, Pa.
Pittsburg & Cin. Division	Hugh Pitcairn		Pittsburg, Pa.
Little Miami Division	J. D Ellison		Cincinnati, Ohio.
Indianapolis & C. Division	D. W. Caldwell		Columbus, Ohio.
Pittsburg, Washington & Baltimore	E. K. Hindman		Pittsburg, Pa.
Pittsburg, Ft. Wayne & Chicago	*J. N. McCullough	Wm. Mullins	Pittsburg, Pa.
Eastern Division	Richard Wiggin		Pittsburg, Pa.
Western Division	C. D. Gorham		Fort Wayne, Ind.
Port Royal	S. C. Millett		Port Royal, S. C.
Port Huron & Lake Michigan	W. L. Bancroft		Port Huron, Mich.
Portland & Ogdensburg	J. Hamilton	John E. Donnell	Portland, Maine.
Portland & Rochester	W. H. Turner.	W. H. Turner	Portland, Maine.
Portland, Saco & Portsmouth	Francis Chase		Portland, Maine.
Portsmouth, Great Falls & Conway	A. A. Perkins		Portsmouth, N. H.
Portsmouth	H. E. Chamberlin		Concord. N. H.
Poughkeepsie & Eastern	J. A. Perkins	A. W. Cable	Poughkeepsie, N Y.
Providence & Worcester	W. D. Hilton	W. D. Hilton	Providence, R. I.
Providence, Warren & Bristol	Waterman Stone		Providence, R. I.

Q

Quincy, Alton & Illinois	N. D. Munson		Quincy, Ill.
Quincy, Missouri & Pacific	John N. Schermerhorn		Quincy, Ill.

Railroad.	*Superintendent.*	*Purchasing Agent.*	*Residence.*

R

Raleigh & Gaston	A. B. Andrews	A. B. Andrews	Raleigh, N. C.
Rensselaer & Saratoga	H. A. Fonda		Albany, N. Y.
Richmond, York River & Chesapeake	Reuben Foster	Hugh Graham	Richmond, Va.
Richmond & Danville	T. M. R. Talcott		Richmond, Va.
Richmond, Fred. & Potomac	E. T. D. Myers	T. L. Courtney	Richmond, Va.
Richmond & Petersburg	R. L. Stainback		Richmond, Va.
Rockford, Rock Island & St. Louis	R. R. Cable		Rock Island, Ill.
Rome, Watertown & Ogdensburg	J. W. Moak		Watertown, N. Y.

S

St. Lawrence & Ottawa	R. Luttrell		Prescott, Can.
St. Joseph & Denver City	L. D. Tuthill		St. Joseph, Mo.
St. Paul & Pacific	E. Q. Sewell	E. C. Becker	St. Paul, Minn.
St. Paul & Sioux City	J. F. Lincoln		St. Paul, Minn.
St. Louis, Alton & Terre Haute	W. G. Broughton		St. Louis, Mo.
St. Louis & Iron Mountain	Arthur W. Soaper	W. S. Cuddy	St. Louis, Mo.
St. Louis & South-Eastern	*E. F. Winslow	C. W. Gardiner	St. Louis, Mo.
St. Louis Division	George S. Winslow		Mt. Vernon, Ill.
Nashville Division	H. L. Morrill		Henderson, Ky.
St. Louis, Kansas City & Northern	W. C. Van Horne	R. W. Green	St. Louis, Mo.
St Louis Division	J. L. Hinkley		St. Louis, Mo.
St. Louis, Vandalia, Terre Haute & Ind.	John E. Simpson.		Indianapolis, Ind.
St. Louis, Vandalia, Terre Haute & Ind.	Chas. R. Peddle		Terre Haute, Ind.
Sacramento Valley & P. & S. V.	F. A. Bishop		Sacramento, Cal.
Saginaw Valley & St. Louis	J. B. Gillett	J. B. Gillett	Saginaw, Mich.
San Francisco & Northern Pacific			
Savannah & Charleston	C. S. Gadsden		Charleston, S. C.
Seaboard & Roanoke	J. B. Pendleton	J. A. Walton	Baltimore, Md.
Selma, Marion & Memphis	J. P. Fresenius		Marion, Ala.
Selma, Rome & Dalton	E. G. Barney		Patona, Ala.
Sheboygan & Fond du Lac	Brandon Mozley	Brandon Mozley	Fond du Lac, Wis.
Shenango & Allegheny	G. H. McKibbin		Greenville, Pa.
Sioux City & Pacific	L. Burnett	L. Burnett	Missouri Valley, Ia.
Sodus Point & Southern	F. A. Bassler		Sodus Point, N. Y.
South-Shore	J. R. Kendrick		Boston, Mass.
South & North-Alabama	D. F. Whitcomb		Nashville, Tenn.
South-Side, Long Island			
South-Carolina	A. Mitchell		Charleston, S. C.
Southern Central	James G. Knapp		Auburn, N. Y.
Southern Minnesota	*H. W. Holley		Wells, Minn.
Southern Pacific of California	A. N. Towne		Sacramento, Cal.
Spartanburg & Union	Thomas P. Jeter		Unionville, S. C.
Springfield & North-Western	*A. J. Ware		Pekin, Ill.
Springfield & Ill. South-Eastern	G. W. Norris		Springfield, Ill.
Staten Island	J. W. Wilbur		New-York, N. Y.
Stonington & Providence	A. S. Mathews	A. S. Mathews	Stonington, Ct.
Sullivan & Erie	R. A. Packer		Towanda, Pa.
Syracuse Northern	C. B. Morse	C. B. Morse	Syracuse, N. Y.
Syracuse, Binghamton & New-York	T. Voorhees	G. W. B. Cushing	Syracuse, N. Y.

T

Tennessee & Pacific	George Maney		Nashville, Tenn.
Texas & New-Orleans	R. B. Baer		Houston. Texas.
Toledo, Peoria & Warsaw	W. H. Cruger	J. A. Winner	Peoria, Ill.
Western Division	David K. Smith		Peoria, Ill.
Western Division	William E. Dorwin		Warsaw, Ill.
Toledo, Wabash & Western	Geo. H. Burrows	J. J. Nessle	Toledo, Ohio.
Eastern Division	C. W. Bradley		Lafayette. Ind.
Western Division	D. A. Collins		Lafayette, Ind.
Ohio Division	H. F. Clark		Toledo, Ohio.
Troy & Boston	C. W. Moseley		Troy, N. Y.
Toronto, Grey & Bruce	N. Weatherston	W. Watson	Toronto, Can.
Toronto & Nipissing	J. C. Bailey		Toronto.
Tuckerton	J. Naramore		Tuckerton, N. J.

U

Union Pacific	T. E. Sickles	T. E. Sickles	Omaha, Neb.
Mountain Division	S. J. Nichols		Cheyenne, Wyom'g.
Laramie Division	S. T. Shankland		Laramie, Wyoming.
Western Division	O. H. Earll		Evanston, Ill.
Utah Central & Southern	John Sharp	S. H. Hill	Salt Lake City.
Utica & Black River	T. W. Spencer		Utica, N Y.
Utica, Ithaca, & Elmira	H. P. Goodrich		Ithaca, N. Y.

V

Vermont & Mass. & Troy & G	O. T. Ruggles	O. T. Ruggles	Fitchburg, Mass.
Vermont Central	Gyles Merrill		St. Albans, Vt.
Western Division	John Schrier		Ogdensburg, N. Y.
Central & Southern Division	Ambrose Arnold		St. Albanus, Vt.
Northern & Eastern Division	G. L. Stone		" " "
Rutland Division	J. Burdett		Rutland, Vt.
New-London Northern	G. T. Benedict		New-London, Ct.
Vicksburg & Brunswick	Virgil Powers	H. Young	Eufaula, Ala.
Vicksburg & Meridian	E. F. Raworth		Vicksburg, Miss.

W

Washington & Ohio	R. H. Havener	Lewis McKenzie	Alexandria, Va.
Welland	William Pay		St. Catherine. Ont.
Wellsboro & Lawrenceville	A. H. Gorton		Corning, N. Y.
Westchester & Philadelphia	Henry K. Smith	J. J. Bryant	Philadelphia, Pa.
West-Wisconsin	J. H. Hull		Hudson, Wis.
West Jersey	W. J. Sewell		Camden. N. J.
Western of North-Carolina	John M. Rose		Fayetteville, N. C.
Western & Atlantic	Wm. McRae		Nashville, Tenn.
Western Maryland	John T. Rigney	John T. Rigney	Baltimore, Md.
Western Union	D. A. Olin		Racine, Wis.
White Water Valley	H. M. Britton	H. M. Britton	Cincinnati, Ohio.
Wilmington & Western	M. C. Conwell		Wilmington, Del.
Wilmington, Columbia & Augusta	James Anderson	James Anderson	Wilmington, N. C.
Wilmington & Weldon	J. F Devine		Atlanta, Ga.
Wilmington & Reading	C. Stoltz	C. Stoltz	Coatesville, Pa.
Winona & St. Peter	J. H. Stewart	J. H. Stewart	Winona, Minn.
Wisconsin Central	C. Harris		Menasha, Wis.
Worcester & Nashua	C. S. Turner.	C. S. Turner	Worcester, Mass.

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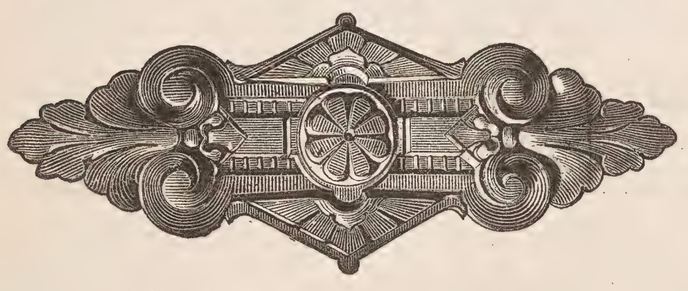

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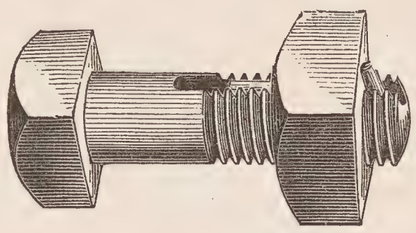
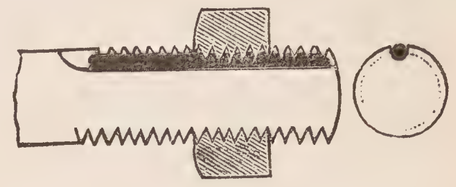


"CUMMING NUT-LOCK,"
Patented
June 16, 1868,
August 23, 1870.



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This simple device, as will be seen by the engravings, consists of a groove being cut in the threaded part of a screw bolt into which is placed a key of copper wire, or other soft metal; when the nut is screwed on, it cuts a thread on the key, thereby making it impossible for the key to get out until the nut is taken off. When the nut is screwed up to its place, that part of the key over which the nut has passed is riveted up against the nut with a small punch, destroying the thread on the key. The nut, therefore, can not move backward until force is used, as with a wrench.

The groove can be rapidly cut with a simple machine designed for the purpose.

Experience has proved this device absolutely reliable, and it is the cheapest of all known devices for the purpose. By its use, old bolts on which the nuts have become too slack for use can be made as good as new, making it a great saving to railroad companies and others in that item alone. It is cheaper than a check-nut.

If the bolt should become slack from shrinking of timber or other causes, *the nut will always remain firmly attached to the bolt*, and, with the wrench, can be screwed up *any distance*, and the wire riveted up any number of times, or can be taken off without injury to the nut or bolt.

This is the only method in use that locks the nut firmly to the bolt without regard to place or surroundings, all others require some attachment that holds the bolt in its position, and a washer or other attachment to keep the nut from turning.

DIRECTIONS FOR USE.—Place the copper key in the slot, pointed end out, and beveled side up, in such a position that when the nut is screwed to its place about three-eighths of an inch of the key will project beyond its outer face. Then screw the nut to its place *over the key*, allowing it to cut its own thread in the copper. Then take a narrow flat set punch, and rivet the projecting part of the key *solidly* against the outer face of the nut. To tighten the nut: screw it up, and rivet the key tighter. To remove the nut: simply apply the wrench and unscrew the nut. It will cut its own way out through the copper. The same key can be used several times, by moving it outward a few threads in the slot.

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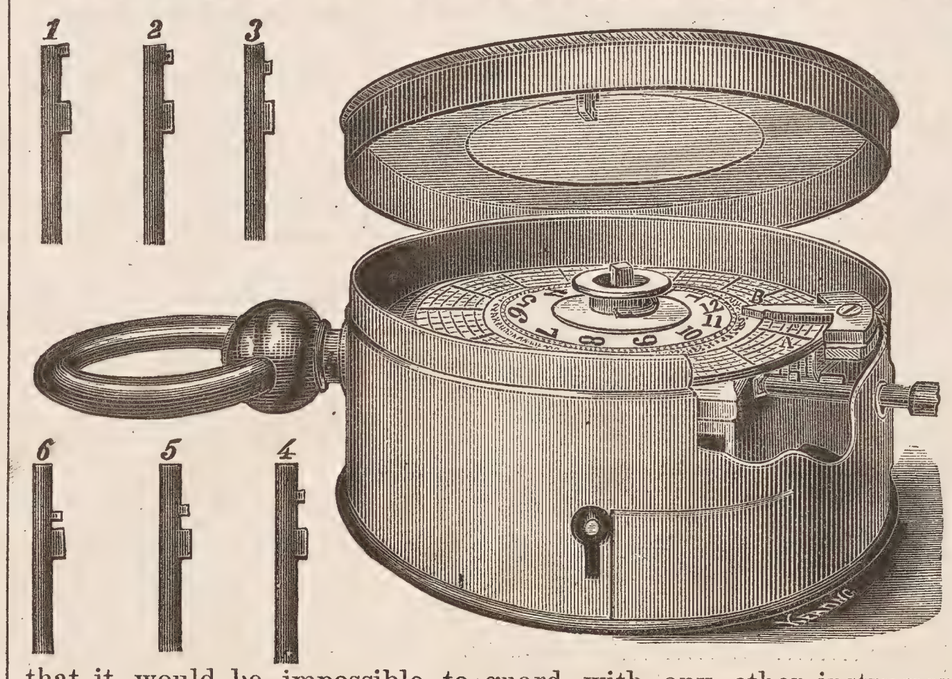

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The instrument is complete in itself, portable, and as reliable as the best lever watch.

It is not so likely to become disarranged in its works as a good watch, because its parts are stronger. But when it needs cleaning, any common watchmaker can adjust it, its mechanism being simple.

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The instrument will, in all cases, be warranted perfect and satisfactory.

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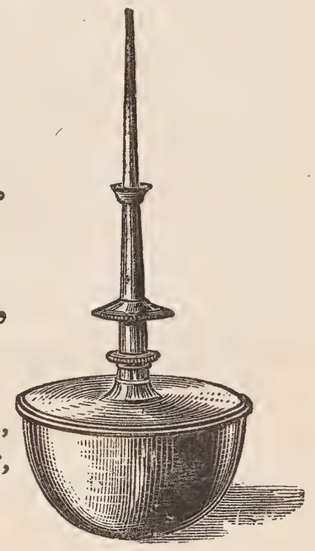

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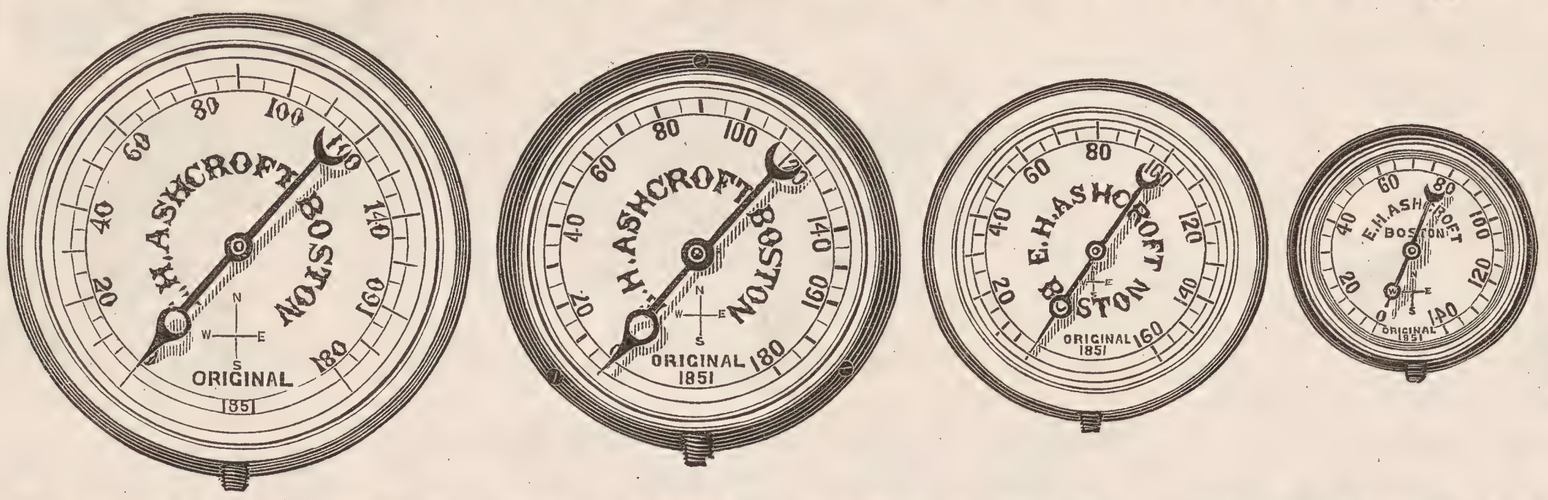

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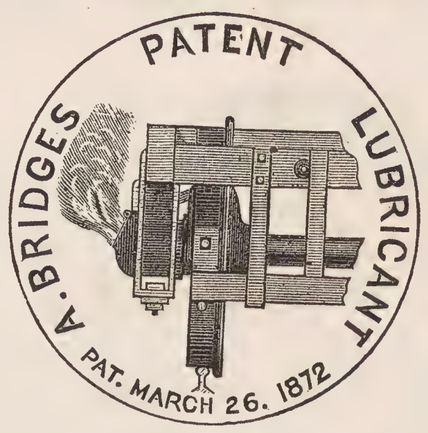

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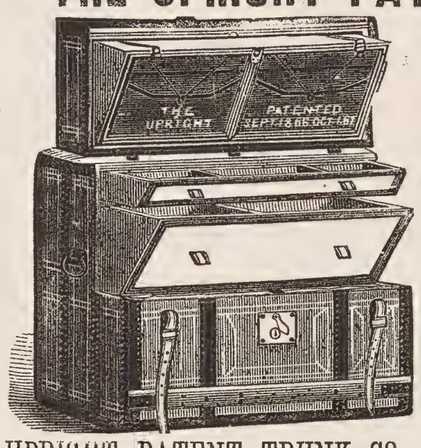

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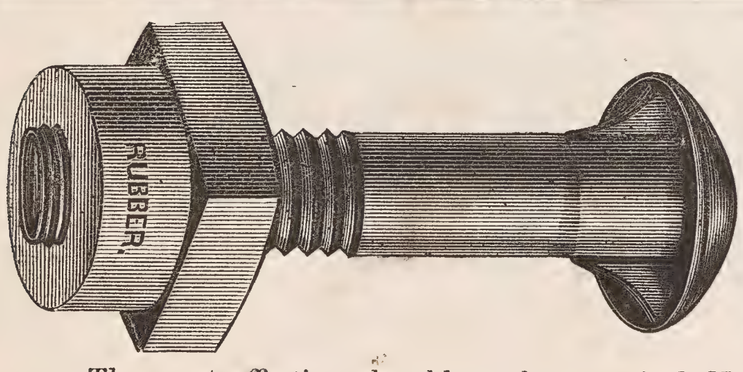

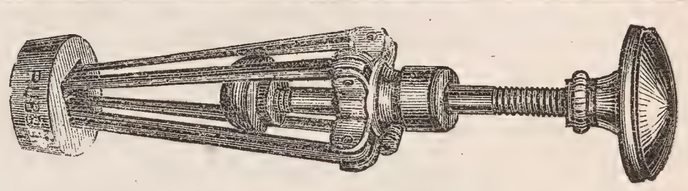

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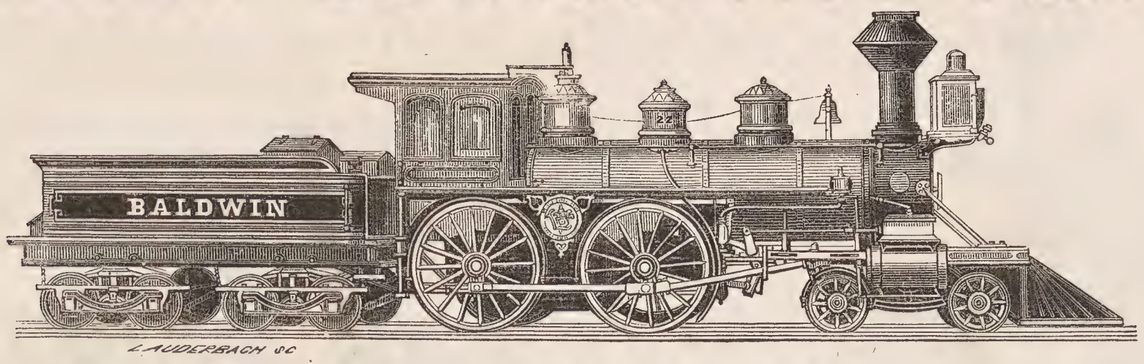

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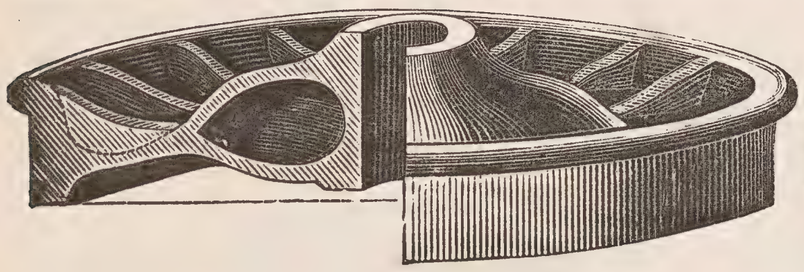

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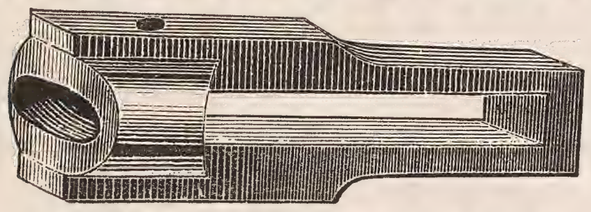

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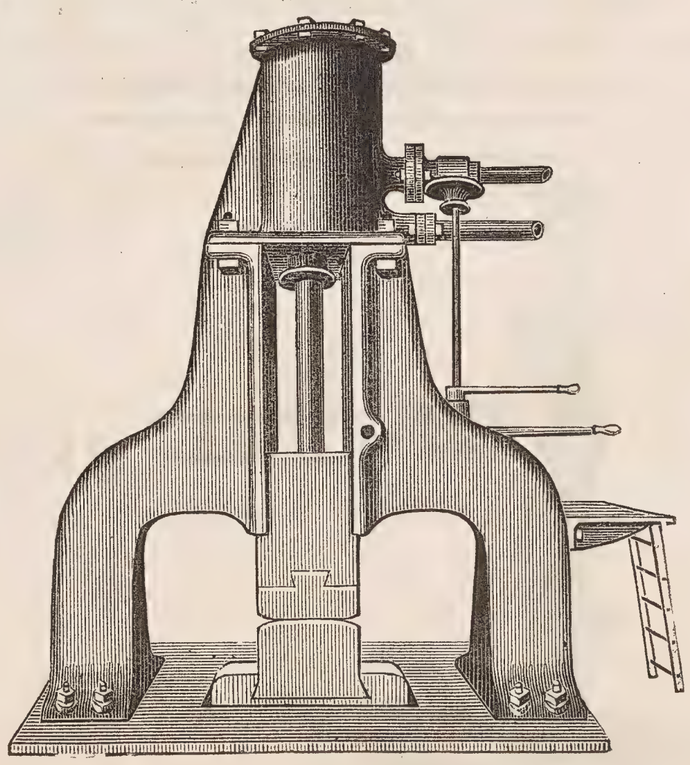

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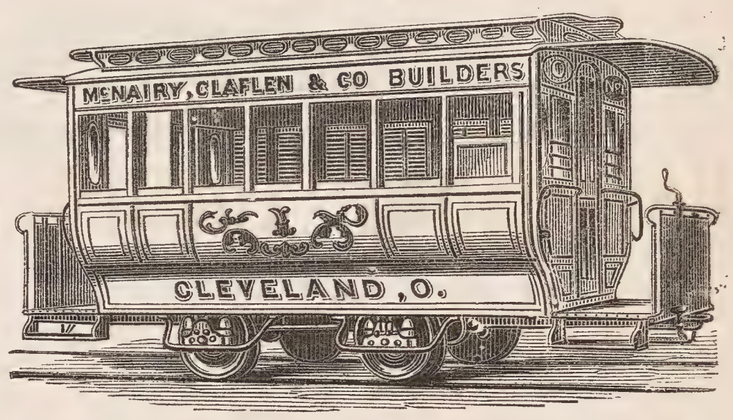

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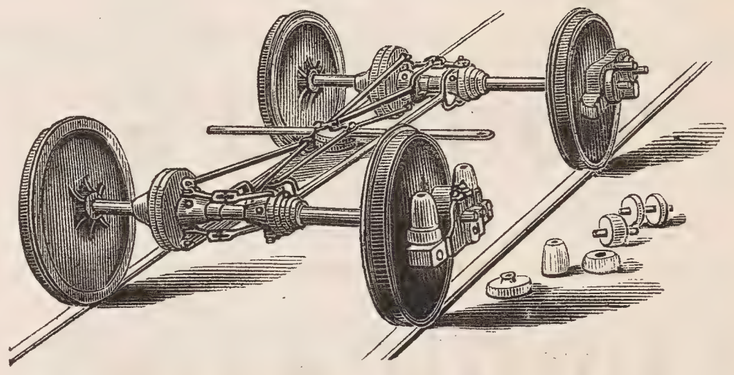

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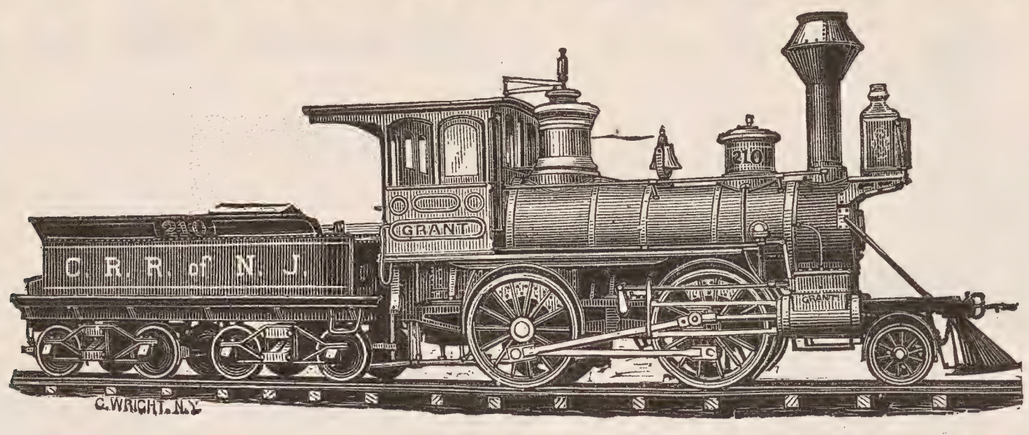

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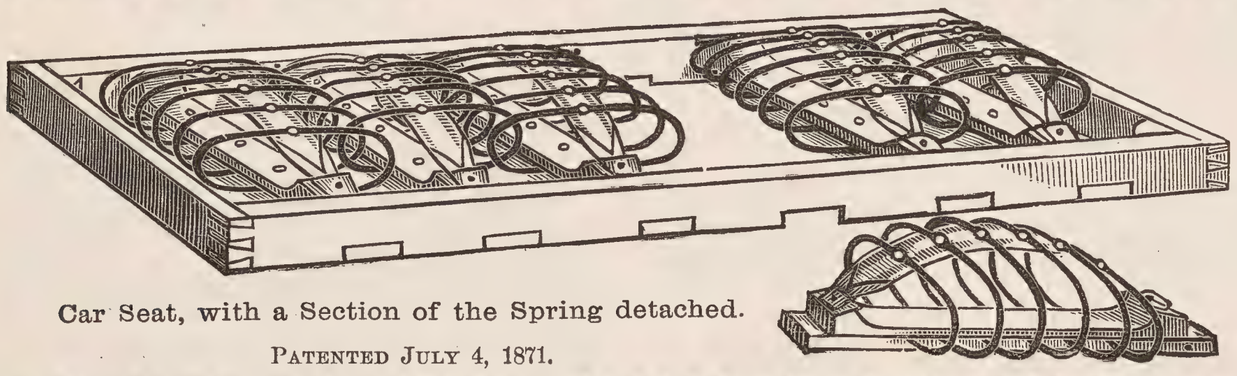

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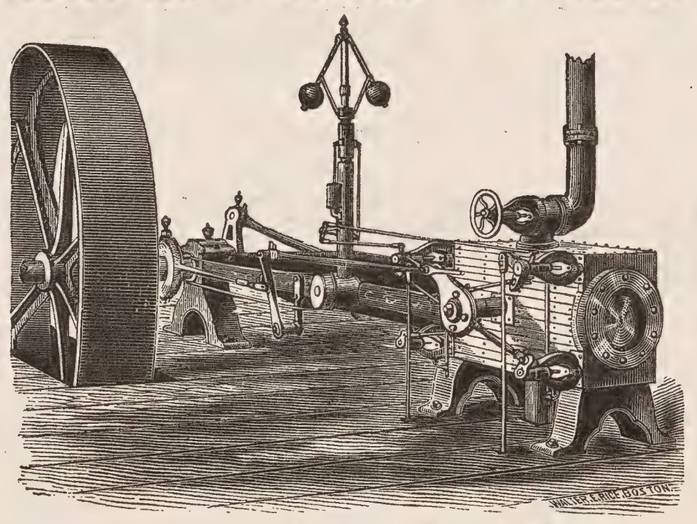

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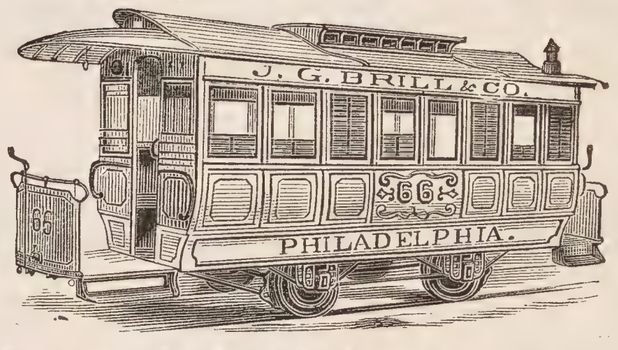

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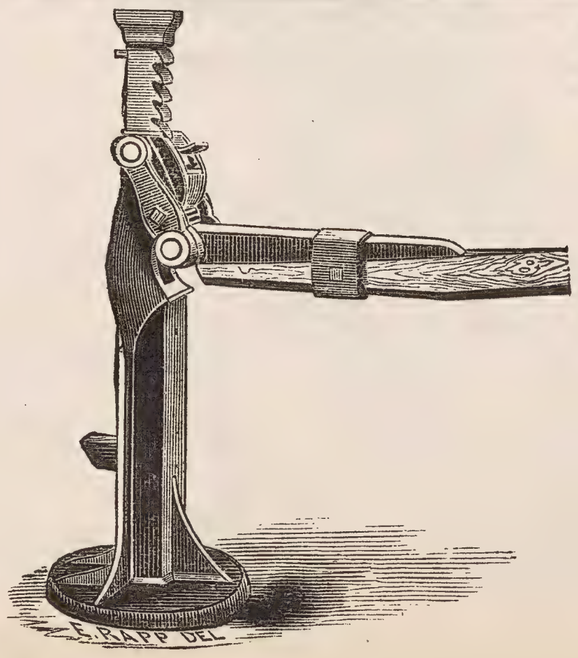

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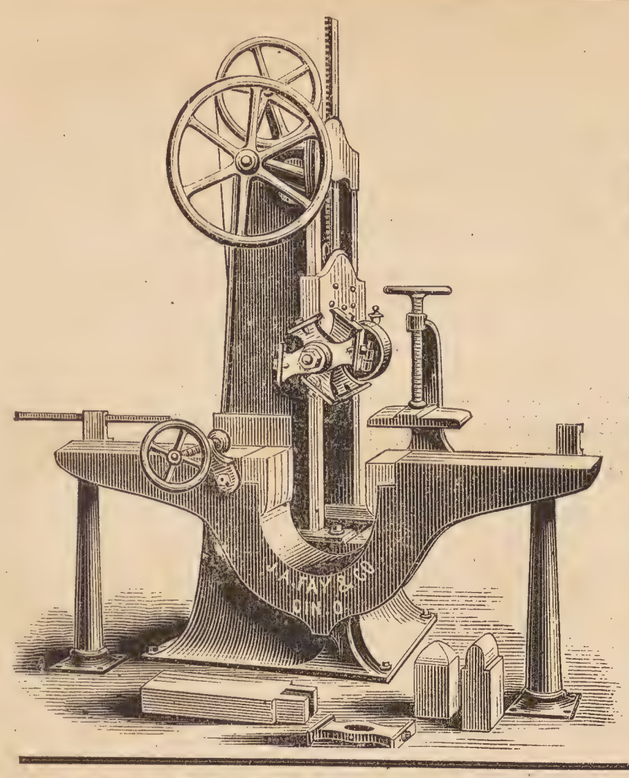

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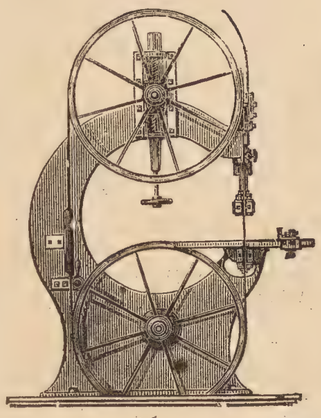

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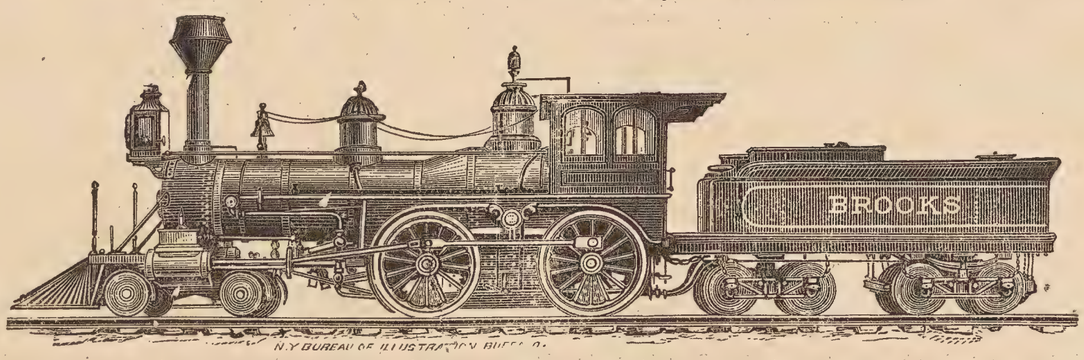

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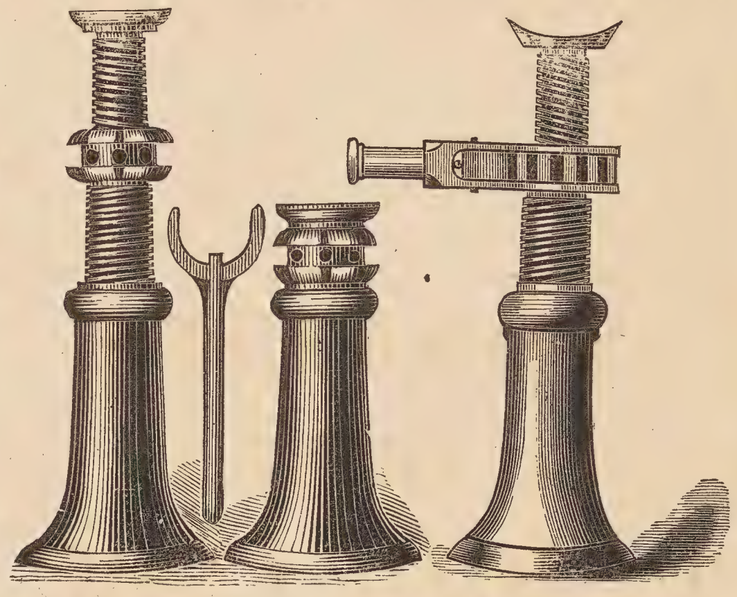

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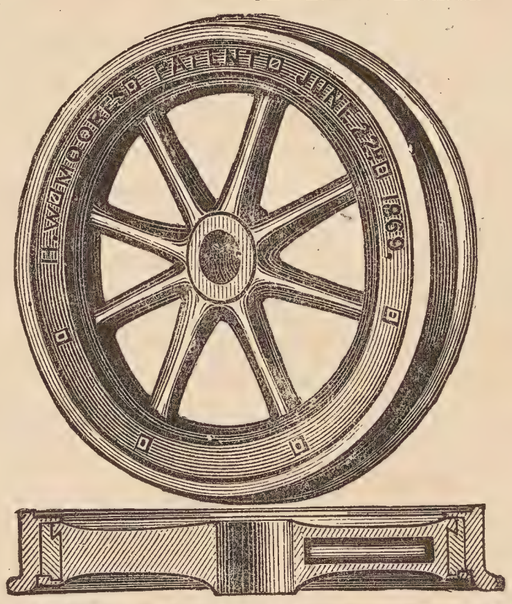

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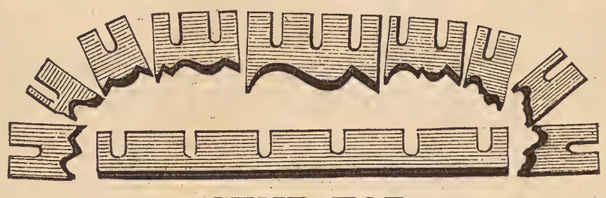

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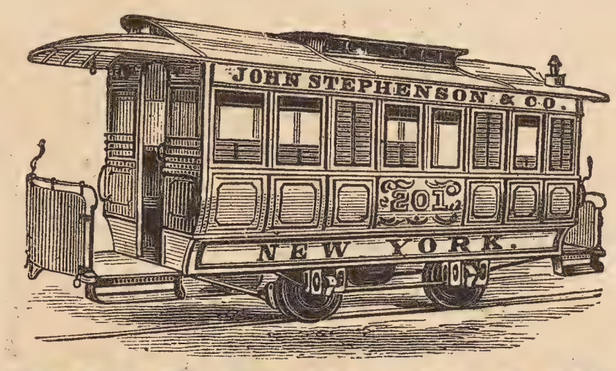

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Cold drafts around car windows and doors in Winter **ENTIRELY EXCLUDED;** also, **Dust** and **Cinders** in Summer by **BROWNE'S** Metallic **RUBBER** Window and Door Bands. Stood the test **10 YEARS** on Drawing-Room and Sleeping Cars in the United States and Europe.

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"I have used, for several years, **BROWNE'S** Patent Metallic Weather Strips and Window Bands on our Drawing-Room and Sleeping-Cars to my **ENTIRE** satisfaction. They do not **CONTRACT** when exposed to the heat of the sun, nor **WARP** or **SPLIT;** and, in fact, they are a **STAPLE** article of practical utility, and I cheerfully recommend them.

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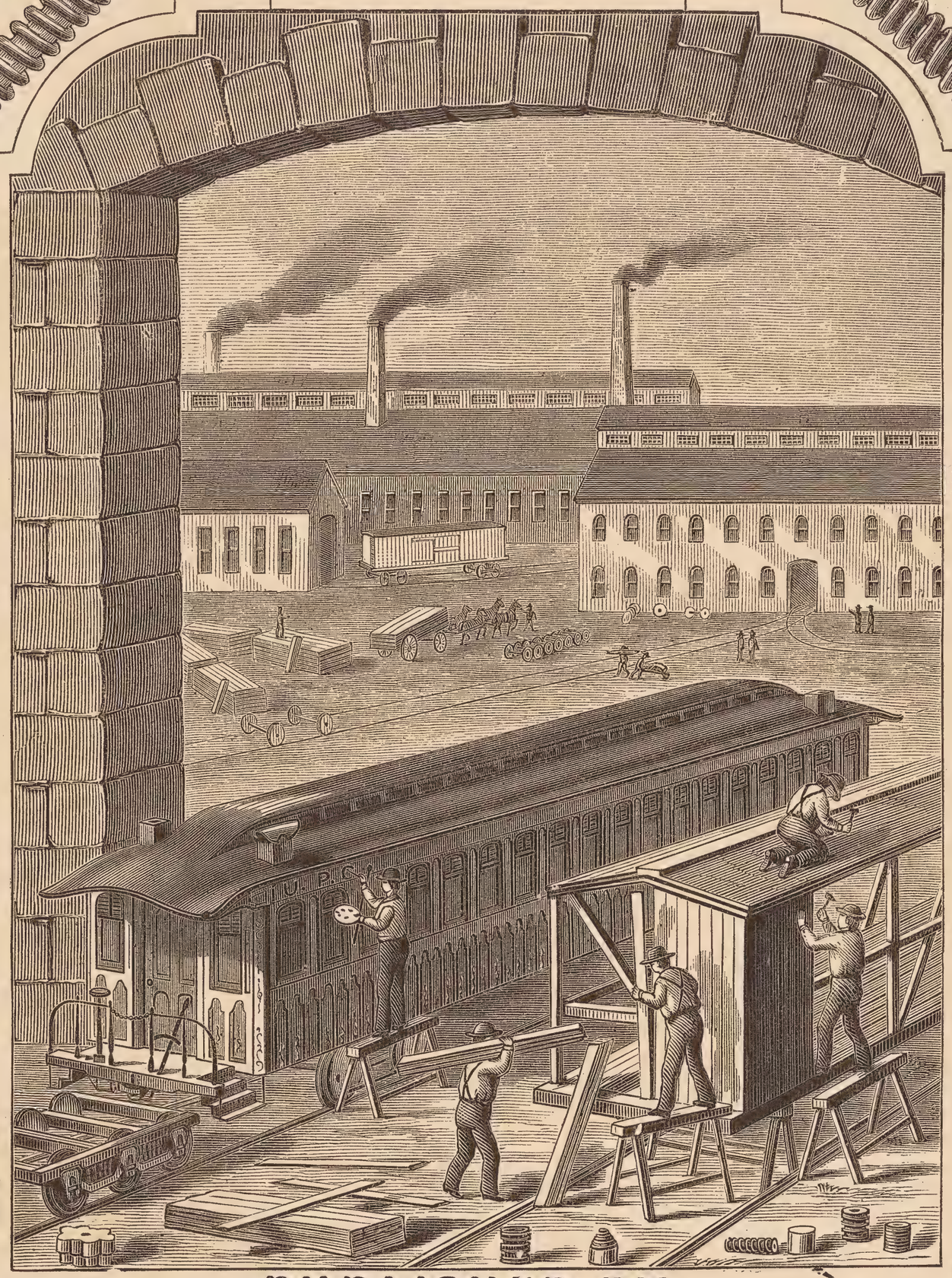
Devoted to the Interests of Railway Rolling Stock.

Vol. IV. SEPTEMBER, 1873. No. 9



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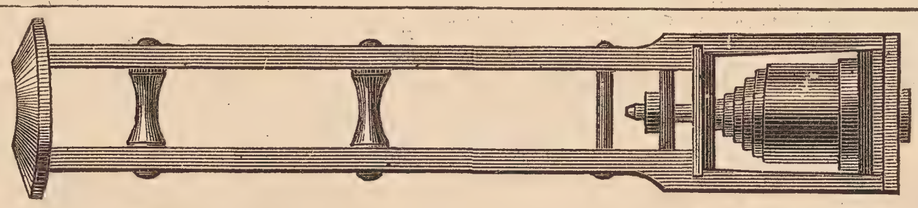

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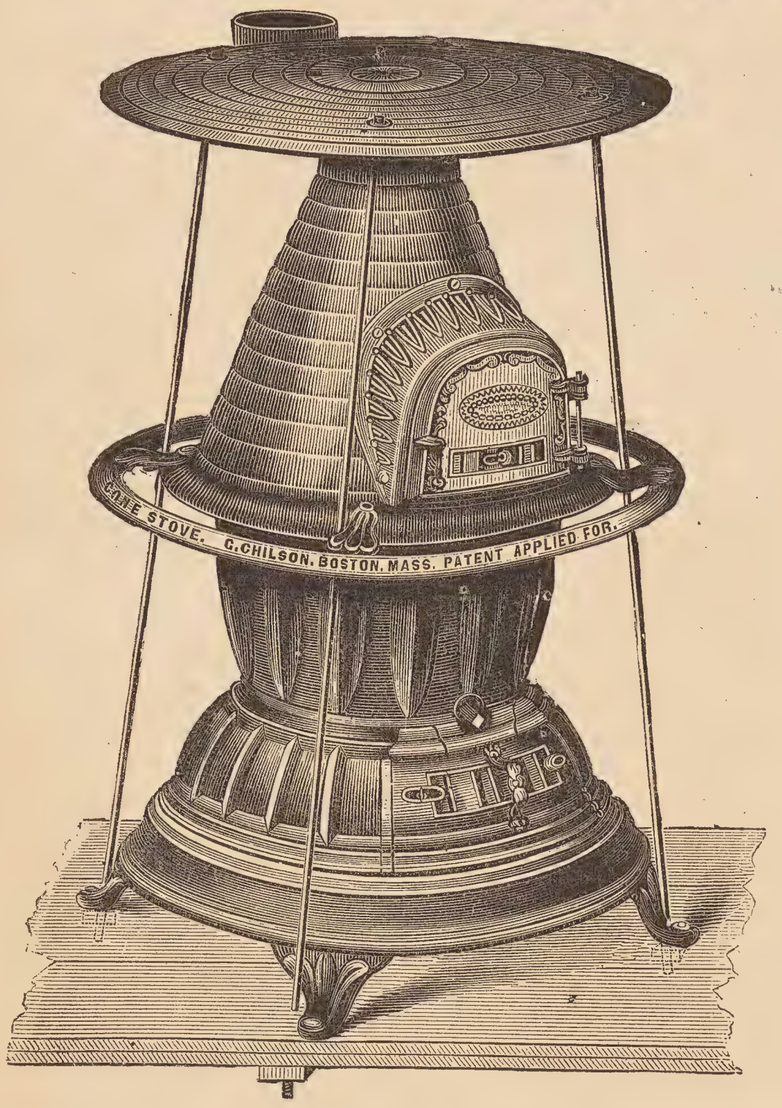
A NEW RAILWAY CAR STOVE.

Chilson's Patent Cone Disk Stove

ON A NEW AND MODEL PLAN.



I WOULD respectfully call the attention of Railway Managers and others interested in warming Railway Cars, Station Houses, etc., to this Stove, which has been thoroughly tested on several of our railways for a few years past, and has proved in every instance the most successful plan yet devised for thoroughly warming Railway Cars. This Stove is on a new and model plan, differing in principle and operation from all others in the United States. I claim for it *Safety*, *Economy*, *Durability*, *Simplicity*, *Cleanliness, and Beauty of Design*. Its peculiar merits may be stated as follows:

1. The conical radiator holds the hot smoke and gases back near the fire until they are thoroughly consumed, and the heat is rapidly radiated from the tapering surface of the cone.

2. The broad radiating disk prevents the heat from ascending to the upper part of the car or room, but distributes and throws it down to the floor, thoroughly warming the lower currents of cold air in the car or room for a great distance around the Stove, thus securing the long desired object of making the *lower part of the car and floor comfortably warm, especially for the feet.*

3. It is constructed in the most substantial and durable manner, from a new and beautiful design, wholly of *cast iron*, hence is not subject to the repairs of common stoves.

4. It is perfectly *safe*, being well secured against *accidental fires by being bolted down to the floor and having locks on the doors, so that in case a car should be overturned, fire could not get out of the Stove.* The guard rail which supports the feet when warming them, also serves as a fender, preventing the clothing from coming in contact with the Stove.

5. There is no hearth for dirt, filth, and tobacco spittle to accumulate on, which insures *cleanliness around the Stove.*

6. This Stove keeps the fire for a long time, and although adapted for coal, yet wood can be burned in it equally well.

It will be highly appreciated by all in want of a superior heater for *Factories*, *Stores*, *Offices*, RAILROAD CARS, and STATION HOUSES, *School Rooms*, *Workshops*, *etc.*, and has especially proved itself to be the most successful plan yet devised for warming RAILROAD CARS.

The BOSTON AND PROVIDENCE RAILROAD COMPANY have over two hundred of these Stoves in use, and the BOSTON AND ALBANY and several other Roads are adopting them, with the most perfect success.

BOSTON AND PROVIDENCE RAILROAD CORPORATION,
Superintendent's Office, Boston, April, 1873.

GARDNER CHILSON, Esq.: *Dear Sir:* We have about two hundred of your new "Cone" Disk Stoves in use, (a part of them for nearly five years,) for warming Passenger Cars and Stations. I can truly say that they have given entire satisfaction. These Stoves possess many important advantages over any other we have ever used, viz.: for warming the floor and displacing the cold air in the lower part of the car, whereby they are rendered much more comfortable, especially for the feet, than by any other plan known to us. The Stove is more economical in the consumption of fuel, more substantial in construction, and consequently requiring less repairs than any other in use, and so securely constructed as to prevent fire from getting out of the stove even should the car be *overturned*. I cheerfully give my testimony in favor of this Stove, and commend it to all Railroad Managers. Yours, etc., A. A. FOLSOM, *Superintendent.*

Numerous other testimonials received from Railroads and other persons having these Stoves in use in Halls, Stores, etc., may be seen at office. Bolts are not required except for Cars and Steamboats.

Chilson's Improved Celebrated Cone Furnaces, for setting in Brickwork or in Portable Casings, Chilson's Unrivaled Double-Oven Brick Cooking-Range; Chilson's New and Splendid Arlington Portable Range; Chilson's very Superior Arlington Cooking Stove; Parlor, Office, and Store Stoves, Parlor Grates, Registers, Ventilators, etc.

Special attention given to putting up Furnaces and Ranges, and the ventilation of buildings in any part of the country.
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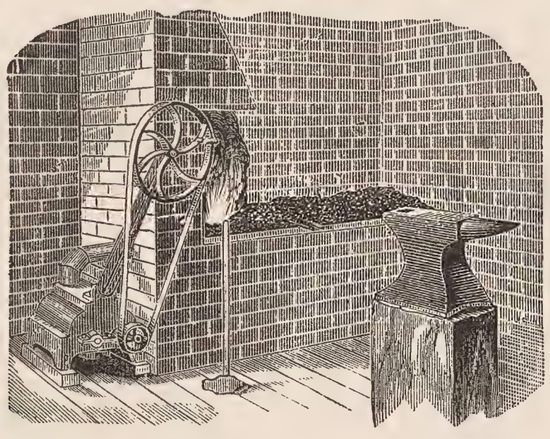

For Carriage Makers, Blacksmiths, and General Forging,

Can be operated by hand or power, and now used by many Railroads throughout the country, of which we name a few—namely, Camden and Amboy Railroad, Central Railroad of New-Jersey; Long Island Railroad; Staten Island Railroad; Belvidere Delaware Railroad; Vermont Central Railroad; Catasauqua and Fogelsville Railroad.

The advantages of this Blower over the old leather bellows, are:

GREATER DURABILITY.

Being made of Iron, it will outlast many pairs of leather Bellows.

GREATER ADAPTABILITY.

It gives a Force Blast that can be raised instantly from the slightest breath to the strongest blast.

GREATER DISPATCH OF WORK.

It heats much more rapidly than the Bellows, and is every instant under absolute control.

GREATER ECONOMY.

By producing a more perfect combustion, it saves a large amount of fuel, besides it occupies but a very limited space, and it ventilates the shop much better than bellows, as it takes the air from near the floor, the natural stratum of foul air.

Thus it saves *coal*, *time*, *space*, and preserves the *health*. No. 1 Blacksmith Hand-Blower will furnish ample blast for one large fire by hand or two by power.

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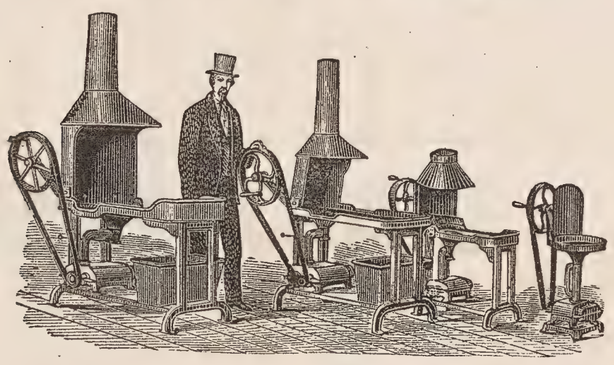
Patent Improved Portable Forge,

THE BEST IN THE MARKET.

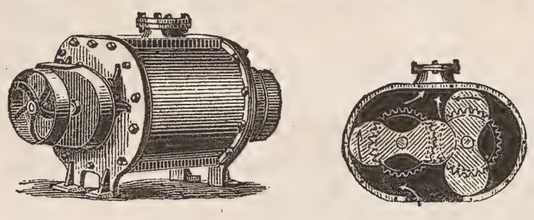


Can be operated either by hand or power, and now used by many Railroads—namely, Indianapolis and St. Louis Railroad; Lehigh Valley Railroad; Central Railroad of New-Jersey; Pittsburgh and Connellsville Railroad; Camden and Amboy Railroad and Ferry Co.; Boston, Hartford, and Erie Railroad; Raleigh and Gaston Railroad, and many others.

The Forge is compact, durable, reliable, convenient, easily moved, and yet has great heating capacity, as the blast is furnished by our Blower, making it in fact the best Portable Forge in existence.

P. H. & F. M. ROOTS ALSO MANUFACTURE

PATENT FORGE-BLAST ROTARY BLOWERS

OF ALL  SIZES,

For Foundries, Blacksmiths' Shops, Rolling Mills, and for Ventilating Public Buildings, Mines, Tunnels, etc.

The Hudson Railroad Co., Indianapolis and Cincinnati Railroad Co., Hanover Branch Railroad Co., Albany and Susquehanna Railroad Co., and Chicago, Burlington and Quincy Railroad Co. have them in use.

Address, for Circulars and Price-List,

S. S. TOWNSEND,

General Agent for P. H. & F. M. Roots,

31 Liberty Street, New-York.

Noyes' Patent Liquid Packing

FOR COOLING

Railroad Car Journals and Bearings of all kinds.

The attention of Railroad men, as well as all others who are running heavy journals is respectfully invited to the above Liquid Cooler. It has been successfully introduced on several Railroads, and is constantly growing in favor as its merits become known, and we are confident that practical men can not fail of being convinced that our preparation deserves their candid attention. What we claim for it is:

That it will cool a journal while a car is in motion, and that its use will in a great measure prevent its occurrence, saving expense, delays, and accidents; that mixed with mineral oil it gives a soft heavy body, essential elements which this oil lacks, especially in warm weather, besides keeping it sweet and preventing oxydation; that a journal will wear longer and with less friction, and be better and more thoroughly oiled; that the heat from the journal is thrown off at a temperature below that required to melt the babbitt, saving it from being destroyed, and preventing an accumulation of heat; that there is less liability of waste packing of journal getting on fire, as the non-inflammable elements of the Liquid permeates the waste and prevents it; that it will cause a considerable saving in the expense of oiling, as it imparts additional lubricating qualities, as well as body which prevents waste from running off, keeps the journal smooth and polished, and hardens the bearings; that a trial will satisfactorily demonstrate its superiority to sperm or lard oil, and that used according to directions it is even cheaper than mineral oil, which is the lowest-priced lubricating oil in the market.

We do not claim the Liquid Packing as a *durable* lubricator of itself alone, but when used with good mineral oil according to directions, we do claim that it constitutes a cheaper, better, and more durable lubricator than any thing offered for the purpose under whatever name.

One thorough application of the Liquid on a hot journal will do more execution in cooling, than the constant application of water for half an hour, besides doing it evenly and without loss of time.

DIRECTIONS FOR USING.

For Cooling off a Hot Journal when Cars are in Motion.—For this purpose procure a can holding two gallons, the nozzle having an outlet of not less than half an inch, and always keep it well filled with the Liquid Packing for immediate use. When a hot journal is discovered, apply the Liquid slowly, first giving the contents of the can a thorough shaking, and then proceed. Examine journal at next station, and if not cooled down to a proper temperature, apply again, and so on until it is accomplished, then fill up the box with native lubricating oil; this is particularly necessary in all cases where animal oil is used as a lubricant. In all ordinary cases this treatment will effectually cool off a journal in a short time, and without causing scarcely any delay of train. *Where a box is on fire*, pour on the Liquid which will extinguish the fire immediately. In extreme cases, where the babbitt metal has melted, or where journals are extremely rough, the journal may become hot again. If so, repeat application of Liquid as directed, and then fill up box with native oil, and so on as often as may be necessary to the end of route. A can of the Liquid Packing, together with a can of native oil, will insure the safe delivery of cars troubled with hot journals, with scarcely any delay. A smoky and hazy emanation from boxes in which the Liquid is used, simply indicates a rough journal, and that the heat is being conveyed away from it. In such cases look to it occasionally, and keep it well supplied with the Liquid. Should the Liquid become too thick to run freely from the nozzle of can, from the action of the weather, thin to the required consistency with mineral oil.

For a General Lubricator.—Add one part of Liquid Packing to two parts of native West-Virginia or paraffine oil, and use in regular way. Or, if preferred instead, use the Liquid Packing in every third or fourth oiling, according to the temperature of the weather and quality of oil. Used in this way, aside from its cooling qualities, it makes a lubricator that can not be excelled in price and quality.

WHAT RAILROAD MEN SAY OF IT.

Mr. Noyes: Fitchburg, Mass., Aug. 20, 1872.

Dear Sir: I have used your Liquid Packing for the past four months, and am perfectly well satisfied that it is the most effectual article ever in use for the purpose claimed. I have just ordered another barrel. If all railroad companies would adopt yonr Liquid Cooler, I think they would find a saving of nearly 20 per cent. when used with mineral or black oil according to your directions, JACOB MARSH, *Master Car-Builder Troy and Greenfield R. R.*

Mr. P. Noyes: Salem, Mass., Aug. 7, 1872.

Dear Sir: I have been using your Liquid Packing for cooling car journals, for some time past, and have been well pleased with it. I have had occasion to use it a number of times, under Pullman Cars, and it has been a complete remedy in every case of hot journals.

Every train should be provided with it, as it is a saving of time and expense in the running of trains, provided it is applied and cared for according to directions for using.

J. P. SOMERBY, *M. C. B. of Eastern Railroad.*

Mr. P. Noyes, Agent: Worcester, Mass., July 11, 1872.

Dear Sir: Please send us another barrel of your Liquid Cooler. Have been experimenting with it for the past six months, and find it all you recommend. It can not fail of accomplishing the work, and with it and a can of native oil, can deliver my cars any where in good condition. I find, however, as you stated, that it will not work with amimal oil, but with mineral oil, and when used according to your directions it works entirely satisfactory. I shall take especial pains to pass its merits along. OSGOOD BRADLEY, *Car Manufacturer.*

Mr. Noyes: Office of Northern Railroad, Concord, N. H., May 26, 1872.

Dear Sir: Send to this corporation a barrel of your Liquid Packing. The sample package cooled four hot boxes within a distance of eight miles. I shall have a can on board each train, for it gives perfect satisfaction. A. LANGMAID.

P. Noyes, Esq.: Albany, Nov. 1, 1872.

Dear Sir: I received the barrel of Liquid Packing you sent me for trial, and gave it out to our most experienced conductors to use according to directions. Below please find their report:

We, the undersigned, Freight Conductors on the Eastern Division of the N. Y. C. & H. R. R.R., have used the Liquid Packing furnished by Mr. Jones, and find that when we arrive at a station with a hot journal, the Liquid Packing cools it sufficiently by the time we arrive at the next station to use the Black Oil, and then have no trouble in getting through with it. It is the best we ever used. R. H. Fisher, A. W. Getmans, R. H. Heath, Wm. Hess, Conductors E. Div. N. Y. C. R. R.; I. Ferguson, Conductor H. R. R.R.

JOSEPH JONES, *M. M. N. Y. C. & H. R. R. R., E. Div.*

Belt and Leather Stuffing Co.: New-York, Providence, and Boston R. R. Co., Providence, Aug. 3, 1870.

Gentlemen: Some two months since I received from you a can (1½ galls.) of your Liquid Packing for cooling Journal Bearings on cars; I had just repaired and put to running an engine; the first trip the truck boxes (all new) heated badly. I gave the Liquid Packing to the engineer and instructed him to use it according to directions. The consequence was that we had no more hot truck boxes. I was so well satisfied with it that I ordered a barrel, and for the past month, when we have a hot box on any of our cars, we apply at once your Liquid Packing, which has in all cases, thus far, cooled the journal so as to give no further trouble or delay. During the past two weeks we have received from the Taunton Car Co. four new passenger cars; the two first when received by us from Taunton had each journal very hot, with the babbitt metal melted out of brass shells, I renewed the metals and packed them with your Liquid Packing. The cars have been running 150 miles each day ever since, with no more hot boxes. Some ten days since we received from the N. L. & N. H. R. R., at the Ferry Boat at Groton, (through express train from New-York to Boston, shore line,) a car having a red-hot box; your Packing was at once applied, cooling the journal so that the men were able in a few moments to put in a new metal; they then repacked with your Liquid Packing, according to your printed directions, and the car came into Providence, a distance of sixty-three miles, perfectly cool, without any further trouble. If it continues to work as well, I can not do without it. I cheerfully recommend it to all Railroads, as being an article which they will find invaluable in all cases of hot journals.

J. H. ANDERSON, *Master Mechanic.*

Send for a barrel. No charge unless it does all we state.

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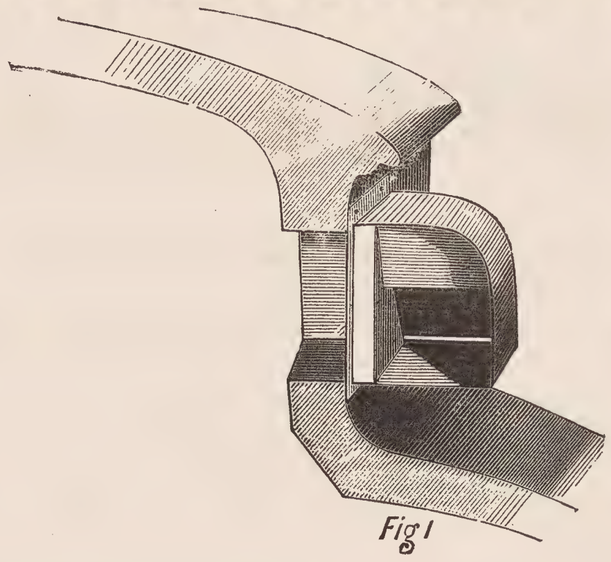

Fig 1

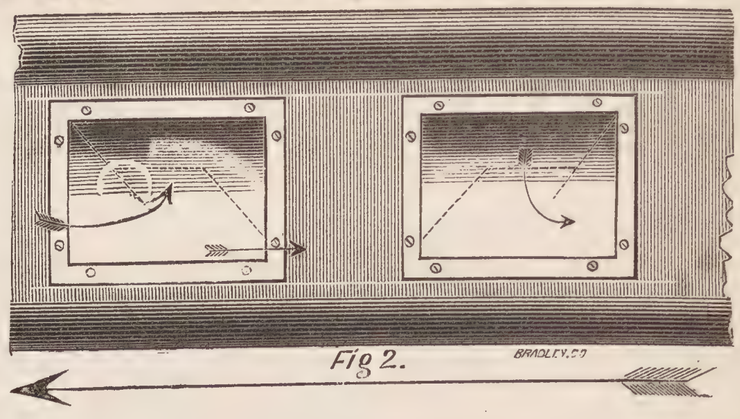

Fig 2.

THE Ventilators are placed as usual in the car roof as shown in Fig. 1, their mouths facing alternately in opposite directions, those facing forward admitting the air, and those facing backward affording an exit. Fig. 2 represents a side section of the raised roof with two of the ventilators alternately arranged. When the car is moving in the direction indicated by the arrow, it will be seen, by the curved darts, that there is an ingress and egress of air constantly taking place. The operation of the ventilators is reversed with precisely the same effect, when the car moves in the opposite direction. The internal structure is such that the dust and cinders passing into the mouth of the ventilator are intercepted by striking against two shields, shown in Fig. 1, and indicated by dotted lines in Fig. 2, and are thus naturally thrown to the bottom, where they are carried out through a small opening as shown in Fig. 1, and by the straight dart in Fig. 2, a current of pure air being forced into the car at the same time through a lateral opening. The faster the car moves, the greater is the quantity of air admitted and expelled, thus securing a free circulation which does not subject the occupants to a direct current or draught. The ventilator is also noiseless in its operation. There is no clattering of valves, and no change is necessary when the car reaches its destination. Once put in place, it is always in readiness, and runs itself independent of all employees.

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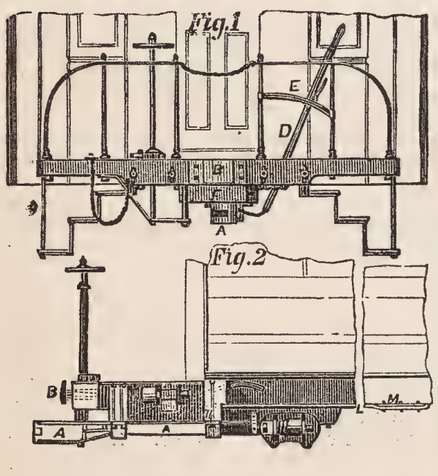

Fig. 1

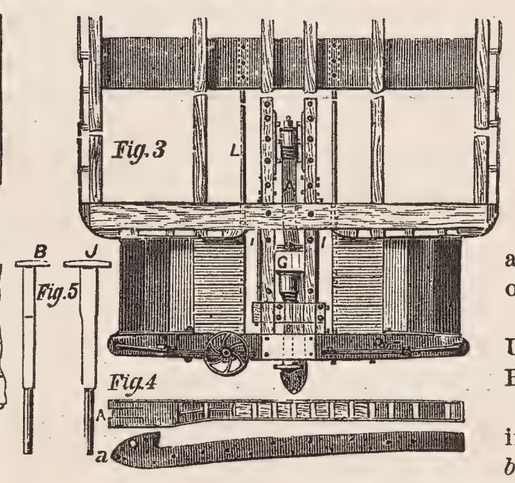

Fig. 2

Fig. 3

Fig. 5

Fig. 4

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Send for Illustrated Pamphlet, and call and see working models. E. MILLER, Patentee

DESCRIPTION.

Figure 1 is an elevation; Figure 2, a longitudinal section; Figure 3, a plan of an end of a car to which the arrangement has been applied: and Figures 4 and 5 show top and side views of the "Hook" and "Buffer," drawn on a larger scale than that of Figures 1, 2, and 3.

The letters refer to the same parts in all the figures. A is the coupling "Hook," B the "Buffer," C the "Stop," D the "Lever," E the "Quadrant Ratchet," F the "Truss Beam," G the "Spring Beam," H the "Suspender Beam," I the "Upward Trusses," K the "Main Spring," L the "Downward Trusses," and M the "Bolster."

The Platforms, instead of being located below the centre line of the main sills of the cars, are placed *in* that ine, and held there by the Trusses I and L, so that the point of contact (in Buffers B) is *in* the said centre line and *not below* it.

The coupling "Hook" A is attached to the draw spring the same as the ordinary draw head, and at the same height above the track, but in such a manner that the outer end is free to move laterally for a short distance. The Coupling Hook projects beyond the platform. The Stop C is placed under the Buffer Beam to prevent accidental uncoupling. When two cars are brought together, the Coupling Hooks, from *their shape*, push each other aside, until the Buffers B are compressed hard on the Buffer Springs, then—*the points of the hooks having passed each other sufficiently far*—the Hooks are carried forward by their main-springs, and thus the "*Coupling*" and "*Compression*" are both effected automatically *and at the same time*, and without the use of links and pins. When two cars are thus coupled together, the *head* of the *Hook* of each car is under the Buffer Beam of its opposite car, and the platforms are close together, (about 4 inches apart.) The effect of this is, *one platform can not be forced over the other*, nor can a *child* fall between the platforms; the dust and rain are nearly all shut out; the "Compression" makes the train run steadily, and prevents all jerking at starting and stopping.

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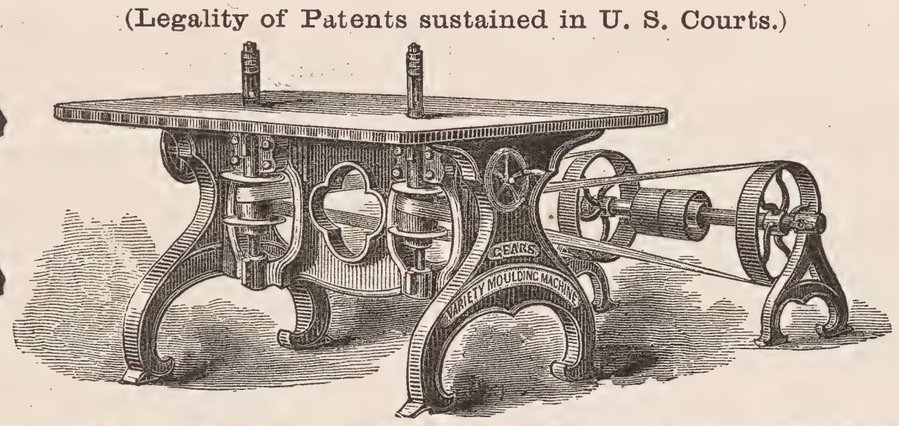

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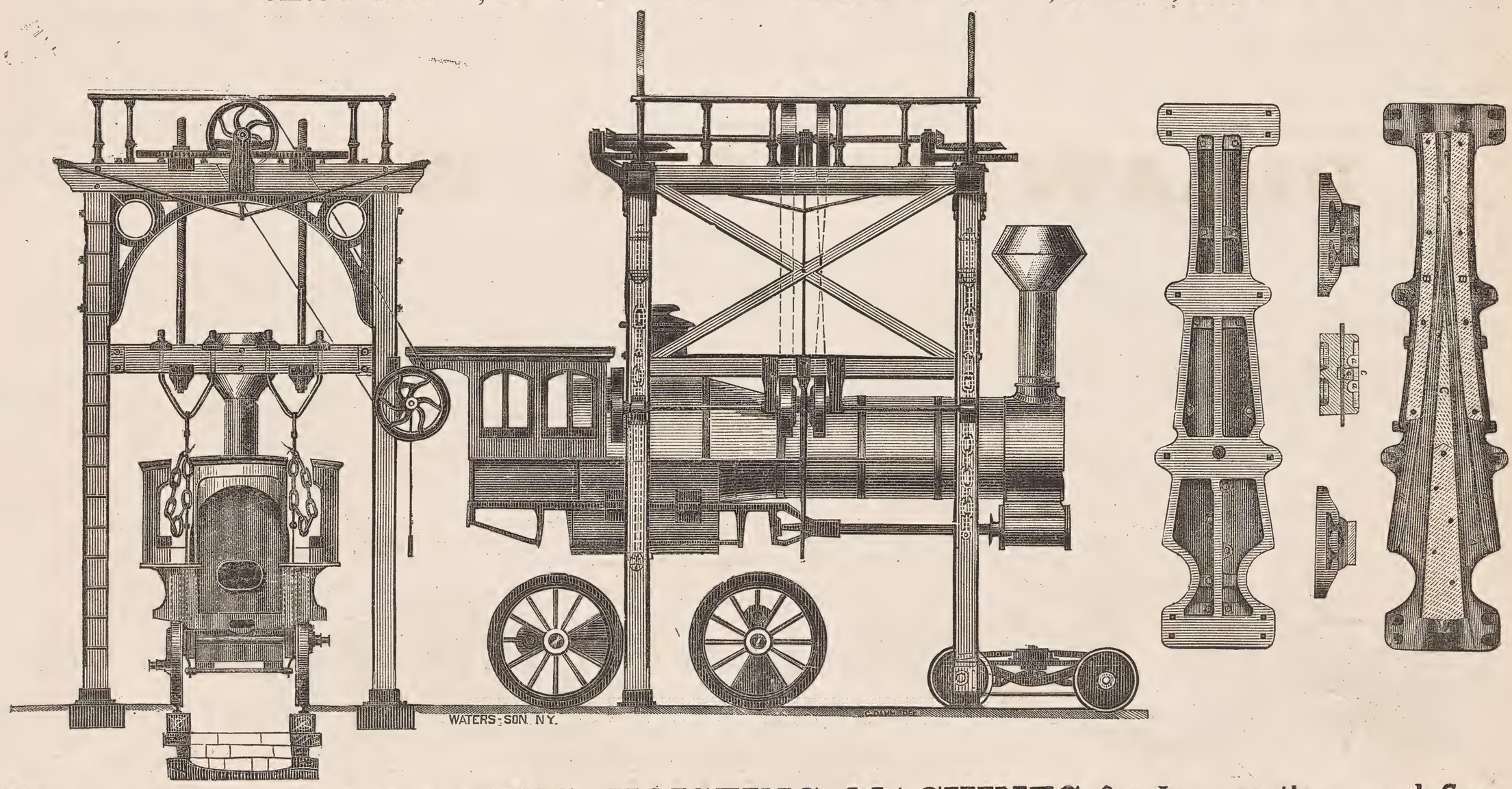

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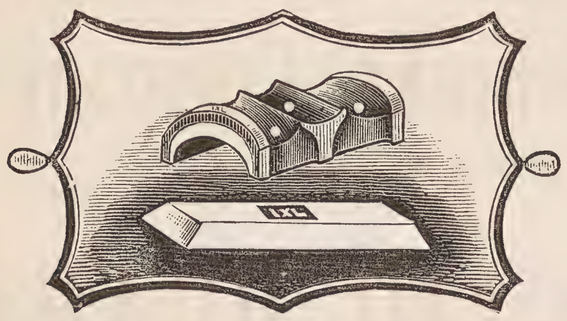

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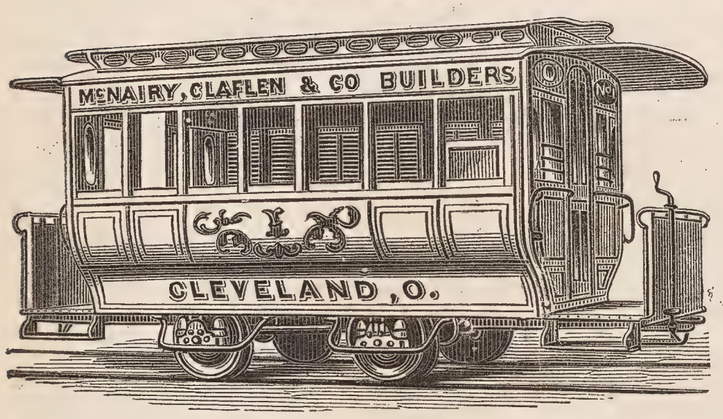

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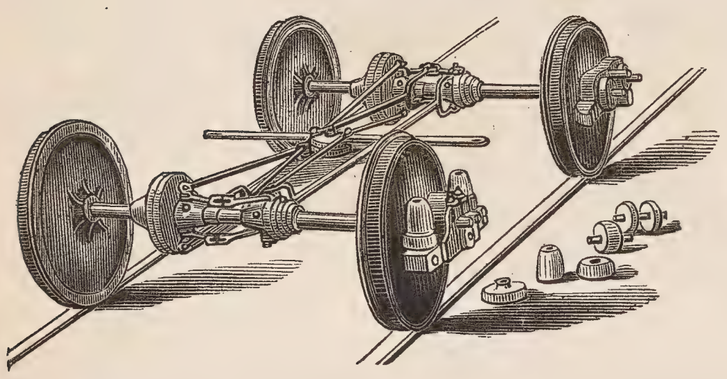

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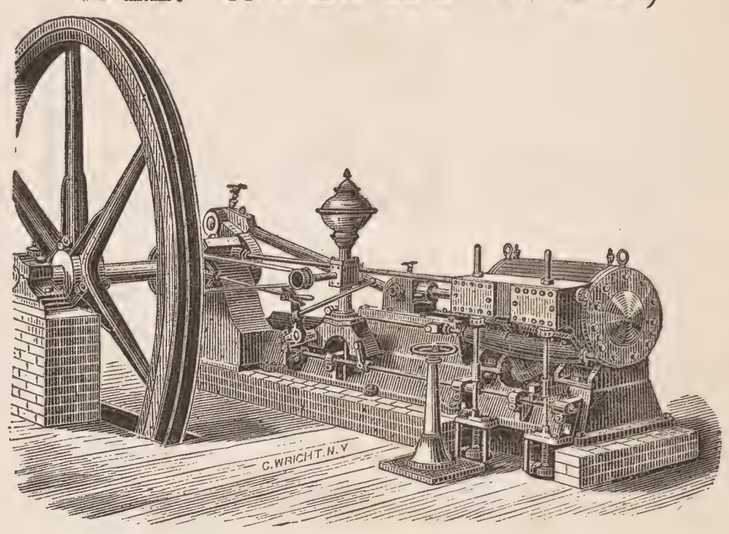

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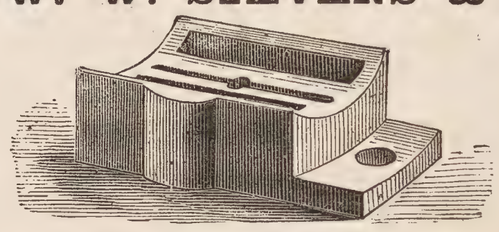

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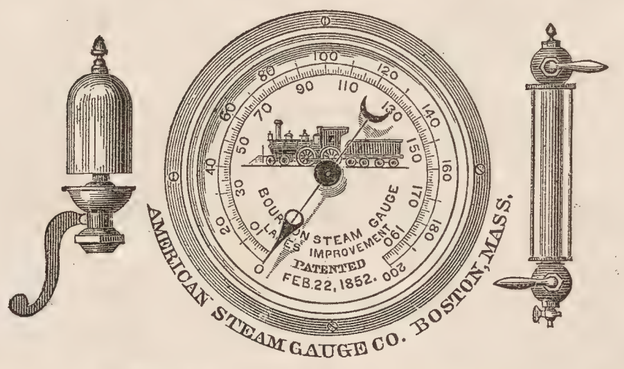

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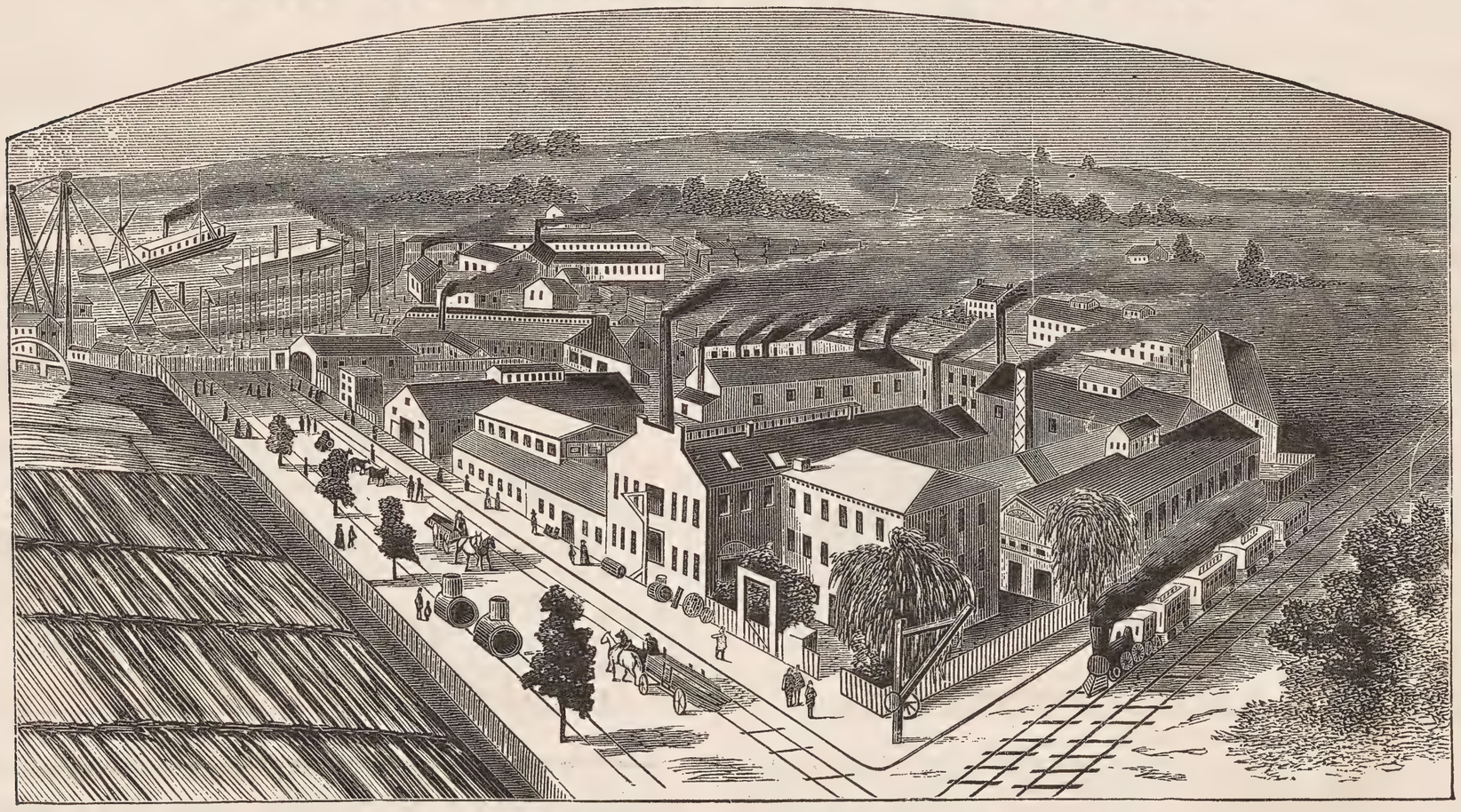

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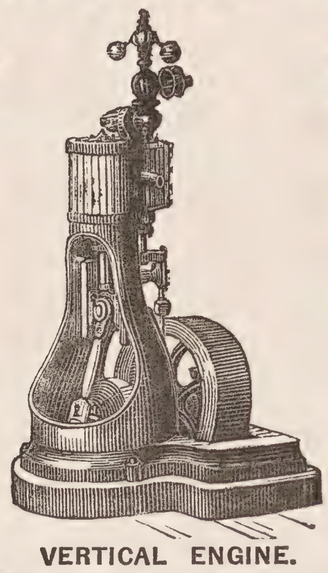

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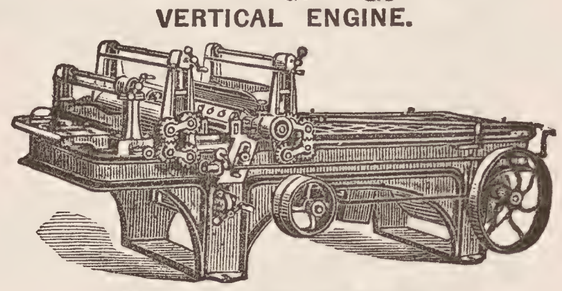

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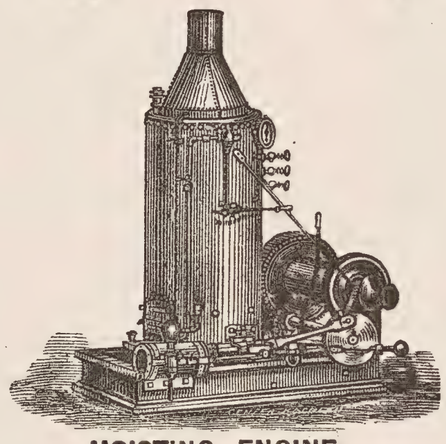

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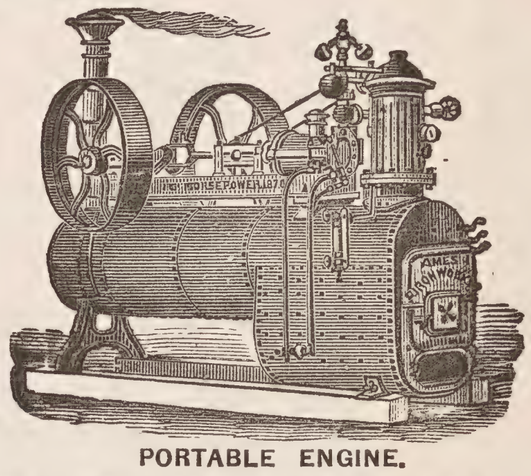

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The New Works of the Wason Car Manufacturing Company.

WE gave in the October number, 1872, of THE CAR-BUILDER, a diagram and brief description of these works, then in process of erection on the line of the Connecticut River Railroad, a mile and a half north of the city of Springfield. The new works are now completed and in full operation, and as a matter of interest to our readers, we copy the following portions of a lengthy notice of them from the Springfield *Republican:*

"The present company owes its creation and prominence to the late Thomas W. Wason, as its broader development is due to the executive force and insight of George C. Fisk, his associate and successor, and to the discriminating financial management of Henry S. Hyde, his son-in-law, and the secretary and treasurer of the company.

"The old shops on Lyman street, which the company have outgrown, were always dark, ill ventilated, and unsuitable, and their inconvenience had grown quite intolerable in the lapse of years. Mr. Fisk determined that the new shops should be light, airy, symmetrical in plan and perfect in convenience—in short, the model manufactory of the city. Accordingly, he devoted himself to elaborating a systematic method of utilizing to the best advantage the sixteen-acre plot devoted to the Wason Car-Works. A survey of the completed buildings will prove that Mr. Fisk's intention has been carried out with entire success. Lying on the west of the railroad and the north of the entire purchase, the plot is occupied by two ranges of buildings, flanking a wide transfer-track that runs east and west between them and into the long lumber-yard.

"This track and the great transfer-table which moves upon it the whole length of the works, are among the most novel and remarkable apparatus to be found there. The works and the lumber-yard, it must be premised, are seamed at regular distances with lateral car tracks. This transfer-table's duty is to receive cars from the railroad switch track, and convey them to the place where they are needed; to take cars from the wood-shops and transfer them to the paint-shops, and to deliver to the railroad for transportation the completed cars; being in short, a movable bridge. The table is 42 feet long, built entirely of iron, except the cab, in the company's own shops, from the designs and under the sole supervision of Superintendent Paige, at a cost of $10,000. Its motive power is derived from a 12 horse-power rotary engine, the invention of Mr. Lyman of this city, and the third engine he has made; and a 12-horse tubular upright boiler. It runs on three tracks set upon eight-foot piles, and operates by means of a chain passing over pocket-gears, and dropping, as the table moves westward, beside the middle track. It can be run its whole distance of 1000 feet in about two minutes with 60 pounds of steam, while ten pounds' pressure is enough to operate it. At any of the 90 lateral tracks it can be stopped instantly or gradually, and moved half an inch as easily as a greater distance; and is in all respects a wonderful and invaluable invention. To properly set forth the details of the buildings between which this engine is the common carrier, we begin where work begins, at the foundry group on the north side of the transfer, and bordering the railroad.

"The foundry itself is 170 feet long, 62 wide, and 35 high to the apex of the deck-roof; a deck-roof, be it explained, being as if the ridge of the roof for 25 feet width were raised some six and a half feet and the sides beneath it occupied by windows for purposes of light and ventilation; an arrangement adopted throughout the new works. Beside the east wall of the foundry stand a set of Howe's 80,000-pound track-scales, the first lateral track passing over their platform, on which cars loaded with iron from the smelting, are received from the transfer, weighed, and run through to the iron yard at the rear, whence the iron is transferred to the great cupola room. There are contained therein three McKenzie cupolas, melting 12 tons each per day, two of them used for wheels and one for floor castings, and contained in a house 40 feet by 28. From these the metal passes into the moulding room, which contains four wheel-cranes, capacity 25 car-wheels each daily, though at present but 72 are made, using three cranes. The full daily capacity of the foundry will be 100 wheels and ten tons of castings. After the wheels leave the moulds, they are taken across the track to a house 80 feet by 38, where they are put into pits to remain three days. Continuous with the pitting-house is the core-room, 30 feet long, for moulding and baking wheel-cores, which are made of a mixture of rye-meal and yellow sand, the latter article being brought from Waterford, N. Y., as all the moulding sand used about here is, and kept in a brick cellar to prevent its freezing in winter. Still north of these buildings is a shed 80 feet by 33 for foundry supplies, directly opposite which is a coal-shed 80 by 40. Twenty-five feet west of the foundry rises the second group of buildings, the machine and smith shops. The machine-shop is a two-story building, 96 feet by 45, the lower story being devoted to heavy and the upper to light machine work, while the trimmings and pattern rooms are also on the second floor. Among the improved machinery that takes the place of the obsolete processes of the old shops, may be mentioned in this shop the Bement No. 30 hydraulic press, for gauging the pressure with which wheels are set upon the axles—a process which was before guess-work, depending on the judgment of the mechanic. At the north of and connected with the machine-shop is the spacious smith-shop, 150 feet by 45, and 35 feet high to the deck-roof, and having a wing 48 by 24 for an iron-room. This shop contains 26 side fires, with new, improved cast-iron forges, three large centre forges for heavy work, a Waters patent 1200-pound drop, and the usual deafening array of trip-hammers.

"The passenger-car erecting-shop, 25 feet further west, begins the next fellowship of buildings. It is 117 feet long, by 75 wide, and the same height to the deck-roof as the shops before mentioned. This roomy area contains five tracks, and is used exclusively for building passenger-car bodies; the trucks on which they are mounted being set up in the lower part of a two-story building 60 by 45, adjoining on the north, whose upper floor will be occupied as a tin-shop. Extending continuously westward from the car-erecting shop, and separated therefrom by a fire-proof partition—a heavy brick wall and double iron doors—is a building 200 feet by 62 and two stories high, with a wing on the north-west 42 by 50 feet. The lower floor of both main portion and wing is filled with machinery for the heavy work, nearly all of which is new, though a portion comes from the old shops. The cabinet-shop above occupies the entire area of the main building, while in the wing are the upholstery and the varnish and seat-trimming rooms, each 25 by 42 feet. East of this wing, and also north of the main shop, is another two-story addition, containing below the engine and boilers. The engine is one of the Providence steam-engine company's, 150 horse-power, 18-inch cylinder, four-foot stroke, and running a 14-foot fly-wheel with 32-inch face. The belt, which is probably the most perfect specimen of that manufacture in the whole country, and of course, therefore in the world, was made by the noted firm of Underwood & Co., of Tolland, Ct., and won the premium of the American Institute, in whose fair at New-York it was exhibited all last winter. It is of double leather, 122½ feet long and 30 nches wide, and cost $1000.

"The engine has been the pet of the workmen, who have decorated it with an elegance seldom approached, from designs of Capt. Pierce, while it is nickel-plated even to every gauge. The bulge of the steam-pipe above the chest bears the monogram of the corporation and the dates 1845 and 1873. The room is a gem of its kind; floored with Southern pine, ceiling and walls sheathed and delicately tinted, and wainscoted with black-walnut and ash. The boiler-room adjoining contains three locomotive tubular boilers of 75 horse-power each, made by Grimes of this city, of which two are used the year round for power, while the third will be attached to render it possible to heat the works in the cold season. One of Berryman's patent heaters, which send the water already warmed into the boilers, is attached, and other of the best improvements. Above is mounted one of the water meter company's three-bell harmonizing gongs, whose sound can be distinguished for miles away. The curious may also be interested to know that the chimney is 85 feet high, and contains 100,000 bricks. The room over these boilers will be occupied for drying, that over the engine for veneering.

"The buildings thus described complete the list of all yet erected north of the transfer-table. They are all of brick, constructed in the most thorough manner, the roofs are slated and tinned, and tracks run through each, connecting with the transfer. It is intended in another season to build north of the main shops two

more large buildings for the erection and painting of freight-cars, both of brick, one story, with deck-roof, and each 180 feet by 42. Passing still westward, the pilgrim through this vast industrial array reaches the lumber-yard, occupying an area of twelve acres. Twenty-five feet west of the wood-work building will be put at once a lumber-shed 420 feet long and 40 wide, two stories high, in which will be stored all the choicest woods used in the elaborate cabinet work expended on the modern passenger-coach ; and a bridge will lead from the upper story directly into the cabinet rooms. The lumber beyond is systematically arranged according to the order of demand, and tracks run through between every two piles, so that a supply of lumber can be taken with the utmost economy of handling. It will be noticed throughout, indeed, that this is the result attained at all points by the admirable arrangement of every shop with regard to the successive order of manufacturing processes, and in connection with the central convenience of the transfer-table.

"The south side of the grounds is occupied for 500 feet in length and 75 in width by the paint-shop, a wooden building 35 feet high to the deck-roof, painted without in showy red and buff, and divided into four sections by fire-proof partitions of brick with iron doors, looking through whose open arches from end to end gives one a clearer idea of the extent of the building than any mere figures can do. This shop stands 70 feet south of the transfer-track. Thirty-two of the longest passenger-coaches built can be at once undergoing the artist's final touches here, entering by the transfer-table from the opposite wood-shops through doors 15 feet high and 12 wide. A noteworthy feature connected with this shop is the keeping of the paint stock beneath ground, in a fire-proof cellar, some distance south of the shop, and communicating with it by a subterranean passage. On the same side, and 250 feet from the west end of the shop, in the lumber-yard is a brick double dry-house, 42 feet by 35, heated by stoves. When all the works are completely filled and run to full capacity, they will employ a thousand men, and turn out daily one passenger and eight freight-cars.

"The office building, not yet completed, is an architectural gem, affording, in its broken outlines and tasteful colors, the relieving ornament to the steady, business aspect of the place. Stock rooms for storing trimmings, etc., occupy half the lower floor, and on the north side are the offices. The main office of the clerks and book-keepers on the west is finished in black-walnut, and contains a remarkably elegant specimen of cabinet-work in its main counter of black-walnut with French burl walnut paneling, designed by Mr. Paige, and executed—as indeed is all the handsome cabinet work in the offices—by the corporation's own employees, as this is a matter precisely in their best line. Mr. Fisk's office is finished in mahogany, Mr. Hyde's in black-walnut with French walnut raised panels ; the handsome mantels and mirror-frames are executed by H. W. Ellis, one of the regular workmen of the company, Burckard of this city supplying the carving. All the windows of the office building, save two in the rear, are of French plate-glass. The upper floor will be occupied for a boarding and lodging-house for ten or twelve single men, picked from the employes to form a hose company, and for whom a competent landlady has been engaged. In order to make their abode the pleasanter, one room will be fitted for a reading-room, and furnished with the city and New-York papers, magazines, etc.

"The mention of a hose company leads us naturally next to describe in detail the water arrangements and the precautions taken against fire. For drinking purposes, every shop is provided with one or more pipe wells, giving the clearest and purest of water. For other uses, the aqueduct main is laid through the centre of the works, on one side the middle transfer track, where are set six double-flush hydrants, with six-inch water-pipe ; there are also two hydrants between the adjoining wood-work and car-erecting shops ; 2500 feet of hose are provided, and in a few minutes any point in the works could be reached, and a stream thrown over any of the buildings. Should the watchman on his rounds discover a fire, he would rush to the office, pull an alarm gong, and arouse the hose company, so that in any ordinary case, a fire in the works would be drowned before it became a conflagration, by the home force, without the aid of the city fire department ; while in case of need, fire-alarm box No. 43 is located at Brightwood for their summoning. In addition to the apparatus above-mentioned, the company have two hose-carriages, and have laid 800 feet of six-inch pipe. All the works, when in perfect operation, will be inclosed by a neat fence, giving no ingress to the public save through the business offices. This closes the account of these great works, whose completion has been for two years past the object of Mr. Fisk's untiring energy and assiduous attention to detail, and will remain a sure attestation to his business sense and ability, his shrewd prevision, and his unerring apprehension of the means to an end."

Railroads in Peru.

PERU does not afford very inviting natural facilities for the construction of railroads. The formidable mountain range running parallel with the coast from the Isthmus to Patagonia, forms a barrier which can only be surmounted by the boldest and most skillful engineering. Impracticable as such an undertaking would have been considered a few years ago, a railroad from the port of Callao over the summit of the Andes, and communicating with the tributary sources of the Amazon, will in all probability be completed during the present year, and thus open an avenue for trade and commerce with that hitherto inaccessible region. The distance from Callao to the summit, by the line of the road, is a little over a hundred miles, and the elevation above the sea-level, 15,645 feet. From this point the road continues about 40 miles further at a descending medium grade. Connecting lines will hereafter be constructed, and the productions of the rich and fertile portions of Peru and Bolivia find an outlet at Callao. The completion of the line now in progress, must necessarily lead to greatly increased activity in developing the mining and agricultural resources of the country, and afford facilities for the introduction of machinery and the employment of capital. The principal productions are cotton, sugar, coffee, and wool, with a prospective development of mineral wealth in copper, silver, iron, and coal.

The road is finished for a distance of 50 miles, and to an altitude of 6000 feet. The engineering difficulties have been great, but it is well built and ballasted. The average grade, as will be seen from the following table of distances and elevations, is about 150 feet per mile from Callao to the summit, a distance of 104½ miles.

Miles from Callao.		Elevation above sea-level, ft.
	Callao	
7½	Lima	448
11¾	Quiros	808
18½	Santa Clara	1,313
33½	Choasica	2,800
44¾	Cocachacra	4,588
46¾	San Bartalome	4,905
51¾	Agua Verrugas	5,840
55¾	Surco	6,655
62¼	Matucana	7,788
77½	San Mateo	10,530
104½	Tunel en le Cima	15,645
119	Yauli	13,420
136	Oroya	12,178

On some portions of the line, however, the grade is 4 per cent, or 211 feet to the mile. On the Pacific road, the steepest grade is 128 feet, and on one of the Australian roads it is 139 feet. In many places on the Callao, Lima, and Oroya road, curves are impracticable ; and in order to turn the train, the road forms a V, at the apex of which is a turn-table on which the engine is reversed, and proceeds by a side-track to the rear of the train, which now becomes the front. The iron bridge over the Agua de Verrugas, a wild mountain torrent running through a picturesque glen 12,000 feet above the level of the sea, is a viaduct structure, the centre of which is 252 feet above the bed of the stream. It was built mostly by sailors, for none but sailors could be induced to work over such a chasm. The bridge is 570 feet long. The spans rest on piers of wrought-iron columns, each pier being 50 feet long by 15 wide at the top. They were raised within themselves, tier upon tier, the only power used in drawing up the material being a common windlass. The cost of the road is estimated at $27,000,000. The ties are brought from Oregon, the rails from England, and the rolling-stock from the United States.

Other Peruvian roads are projected and in progress. One from Arequipa to Cuzco and Puna, and one from Chimbota to Huara are being rapidly constructed.

Mahogany.

THE finest trees come from Honduras, and the cutting, transporting, and handling of this valuable wood is at once peculiar and interesting. At the present time, the most valuable trees are the most difficult to secure ; as those most accessible have long ago been cut. The country in which the mahogany-tree grows is one in which the most venomous reptiles are found, as well as biting, stinging insects ; and eight months of the year dangerous fevers exist in epidemic forms. It is here, in the month of August, that a lot of natives, usually thirty or forty in number, proceed into the forests to cut mahogany logs. One of their number precedes the others, to hunt up the most valuable trees ; when the site is found and determined upon, a number of cabins are erected for the laborers, as they remain there until the season for cutting ends, which takes place the last of the month of December. Stages are erected around the trees and the choppers cut down the same about ten to twelve feet from the ground. Where the distance is far from a water-course, the logs are loaded upon wagons and hauled to the stream, and anchored until the streams rise in the month of June, when they are floated out to larger streams, where they are loaded on vessels to go to Europe. The logs are always squared in the forests to save weight in transportation ; but the veneering into which it is afterward cut is never done in Honduras, but is made into the thin boards in Europe and the United States. Much of the labor in cutting, preparing, and hauling is done at night ; torches being used to give light to the work. The extreme heat of the day-time makes it necessary to do much of the work in the night.—*Cabinet-Maker.*

A New Rail.

THE Angle-Iron Railroad Company, of Chicago, are manufacturing a new, cheap, and novel kind of rail, which consists of a heavy plate on top of a wooden rail, with a vertical plate at right angles with it, and facing the inside of the rail, the two plates forming one piece. When the top is worn, the iron can be reversed, and the side placed on top, and the top at the side.

A correspondent of the Chicago *Railway Review* says, with reference to this rail, that in the matter of railway construction, we have in some respects, been traveling too fast, and must retrace our steps and cease extravagance both in the first cost of our railways and machinery, and in their maintenance as well. This problem must be speedily solved, else many of our local and competing lines must go under ; and yet no agricultural, mining, or manufacturing community can afford to have this take place. No portion of our country can become settled, or remain settled, without railway facilities. What are the chief destructive and expensive elements of the road after it is built? Its rails and machinery. The original rail, forty years ago, was a merchant bar or strap, laid upon a piece of timber, with holes punched for small spikes. Its cost was one fourth that of the T-rail, and its dur-

ability was almost indefinite, resulting from an elasticity of such a combination. This is no idle declaration. The writer had occasion, in 1857, in the construction of the Western Maryland road near Baltimore, to take up ten miles of strap rail of but ten pounds to the yard, that had been in constant use for twenty-five years, and it was so little worn that it was good for twenty-five more. The first half of this time, the road was operated by a primitive locomotive, brought from England, and consequently very hard upon the rail on curves of 400 feet radius. The objection to the rail then was, that the ends became unfastened and curled up, "snake-heading;" though I think the bolts might have been riveted through the plates supporting them. The T-rail, from its height, rigidity, and quantity of metal, rapidly accelerates its own destruction, and also that of the machinery. Besides, when ten per cent of the whole mass is battered and unwelded, the balance is useless till gathered up, transported, re-rolled, and brought back, at great expense, at frequent intervals. What is the remedy? A rail that will give the wearing life of the strap, without its objections, with the partial stiffness of the T, and will cost but half as much per mile.

A Narrow-Gauge Car.

THE correspondent of the Waterloo, Ill., *Advocate* has been riding upon the Cairo and St. Louis narrow-gauge road, and thus gives his opinion in regard to the cars:

"On Saturday last, the first regular passenger-coach passed this place, going south. It has a width of seven feet, and is furnished with twenty-two arm chairs and sofas at each end. There is an aisle down the centre. The chairs are of walnut, handsomely carved in antique style. The aisle is carpeted with Axminster brussels. The upholstering is tasteful and suggestive of luxury. The windows of plate-glass and large, with a very neat double-blind to drop and raise. The woodwork within of walnut and oak, and paneling of English walnut, finished to a degree of perfection almost incredible to behold; and, to complete all, two very handsome lamps, suspended from the ceiling at each end. This coach—and all are to be like it on this road—is only equaled by the Pullman palace cars. This being the first trip of the coach, some doubts were expressed as to its running qualities, but at the end of the first mile, it was perfectly evident to us that a more comfortable or easy-riding insitution could not be gotten up; and as we sat in a half-dreamy state, we remembered how hard we had labored for this road, how abiding our faith had been in it, and how we had endeavored to instill the same into our readers."

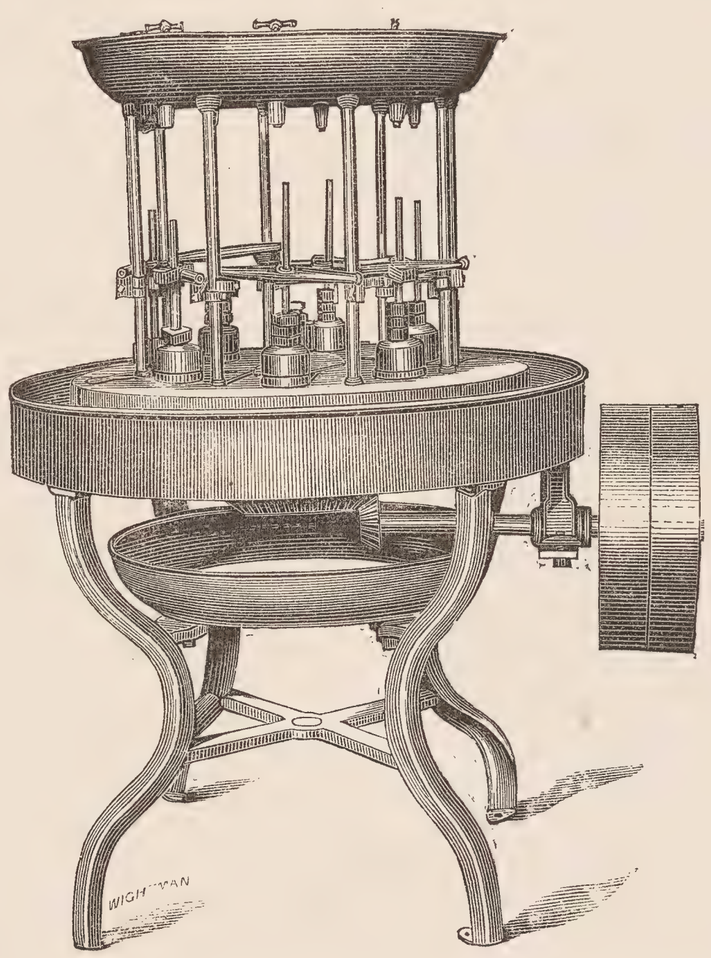
The car here spoken of was designed and built under the superintendence of Mr. Thomas Doran, at the car-works of Messrs. F. E. Canda & Co., in Chicago.

A New Invention.

A PATENT has been secured by Mr. G. Natcher, of Huntington, Pa., for an electric railway reporter or signal, which is operated on ordinary telegraphic wires attached to tappets, so placed as to receive the weight of the car-wheels, which thereby open and close the current of electricity, which current, striking upon a bell or bells, causes an alarm to be given, a rod, a mile or miles, if advisable in advance or rear of a train. A signal, stationed at a crossing, will be rung instantaneously at any fixed distance as the train approaches, thus giving fair notice to all persons to clear the track. One of these alarms placed at a station will report a train, tappet after tappet, until it passes on to the tappets of the next signal station, where a similar report is made, and so on to the end of the route. If a train is delayed or wrecked, it will be immediately reported at the station, and other trains regulated accordingly, by which means hundreds of lives and vast quantities of property may be saved. The improvement that enables trains to give notice of their approach to crossings and to approaching trains, meets a want that has long been one of the most serious embarrassments to railroading. We doubt whether this invention is second in importance to the atmospheric brake. The general speed at which trains are now run, owing to the late inventions, makes it absolutely necessary to use electricity as an alarm or signal agent.

Durrell's Patent Nut-Tapping Machine.

THE engraving illustrates a machine for tapping nuts, which is now being used in a number of the leading car-shops of the country. The essential thing in this, as well as in most other kinds of mechanism, is the saving of labor and time, which is a saving of expense. This is accomplished by this machine in the rapidity and effectiveness with which it does its work, it being so constructed as to run *seven* taps with three different rates of speed. Two of the taps may be run with the fastest, two with the slowest, and three at a medium speed, at the same time, the gearing being so arranged as to enable the operator to get the desired speed for any given-sized tap; or all may be run at any of the three speeds, if so desired, by having the necessary extra gears. By substituting the necessary gearing, which can be easily done, three, two, or one of the taps can be run "left



hand." The machine has a tight and loose pulley attached, as shown in the cut, and may be run from a main or counter line of shafting. The necessary oil is supplied from a reservoir, and regulated by graduating cocks, by means of which all undue waste is prevented. There is no gumming or obstructions in the sockets from chips, cuttings, or oil. The sockets for holding the taps are so constructed that any tap will fit and work in or on any spindle, and the nuts, when finished, drop below the teeth of the tap, and when full, the tap can be taken off and replaced without stopping the machine.

The machines weigh 950 and 1050 pounds, the former being designated as No. 1, and taps from 1½ inches down to the smallest size; the latter, or No. 2, taps from 2 inches to the smallest size, the difference in the respective numbers being in the size and strength of the gearing. Both occupy the same space on the floor.

The advantages of this machine over any other device for cutting nuts, can of course, be best understood and appreciated by using it or seeing it used. What is claimed, however, in its behalf is, that nuts of the same or different sizes may be cut by it as rapidly as one man can put them on and take them off the taps; that the attendant can be kept busy, and at the same time run at a speed sufficiently slow to preserve the life of the tap; the motion or speed of the taps is within the control of the operator, and may be made fast or slow as desired; and one or any number of the taps may be used as required.

The proprietors and manufacturers, Messrs. J. N. & W. F. Durrell, of Dunkirk, N. Y., also make this machine with a cone on the shaft, instead of pulleys, the advantage derived from a cone being that establishments accustomed to tap one size of nuts at a time can accommodate the speed upon the cone for different sizes without changing the gears. This style of the machine has been found very advantageous for nut and bolt factories, as well as others where but one size of nuts is tapped at a time. Any further particulars may be obtained by addressing the proprietors, as above.

Railroad Earnings in Great Britain and the United States.

WE copy from Poor's *Manual* the following tabular statement showing the mileage, cost, earnings, etc., of the railroads of this country and of the different sections thereof, as compared with those of Great Britain. The table is preceded by the following comments:

"The railroads of Great Britain are the only ones, outside this country, the results of the operations of which can be compared intelligibly with those of our own. But it would be improper to compare the railroads of Massachusetts with those of Iowa in hope of deducing any valuable inference therefrom; the earnings of a railroad depend upon its age. Those in Massachusetts, the greater part of them at least, have been in operation twenty years; those of Iowa, say five. The investment in each State may be nearly the same per mile; but the earnings, from the short time in which the roads of the latter have been in operation, may not be half as great in one case as in the other. A comparison of the results of the operation of the railroads of the United Kingdom with those of the United States is subject to the same objection, as the railroad mileage in the former increases very slowly, while that of the railroads in the United States has doubled itself within ten years. It would be proper to compare the railroads of the former country with those of New-England and perhaps of the Middle States. We have, however, annexed a tabular statement comparing the results of railroad investment in the two countries, and of the former with those of the different sections of the latter. Of course, a comparative statement made a year from this time may show very different results. The earnings of the railroads of Great Britain are for 1871, and are given at $5 per pound:

Groups for Comparison.	Railroad Mileage.	Cost of Road.	Cost per Mile.	Earnings.	Earnings per Mile.	Percentage of Earnings to Cost.	Percentage of Net to Cost.	Earnings per Head of Population.
States. New-England..	$4,574	$230,609,794	$50,418	$48,519,835	$10,636	21.10	6.26	$13.53
Middle.....	11,617	922,700,774	79,427	169,205,702	14,565	18.30	6.40	15.86
Western.....	28,778	1,472,625,232	50,550	193,826,252	6,735	13.10	4.57	13.76
Southern.....	10,986	401,913,267	36,579	47,788,539	4,350	11.80	4.09	4.31
Pacific.....	1,368	131,573,990	98,300	13,900,727	10,161	10.50	6.00	17.00
United States..	$57,323	$3,159,423,057	$55,116	$473,241,055	$8,256	15.00	5.20	$11.76
Great Britain..	$15,376	$2,763,400,535	$178,720	$244,463,900	$15,900	8.49	4.65	$7.70

The Pennsylvania Railroad Machine-Shops, near Jersey City.

ABOUT a year ago, the Pennsylvania Railroad Company commenced the erection of extensive new shops on the line of the road, about four miles west of Jersey City, on a portion of the land lying between Newark and the Hackensack River, and familiarly known as the "meadows." The ground being boggy and marshy, much preliminary labor had to be expended in preparing a suitable foundation for the numerous heavy structures, by driving piles to a great depth. For several months past, a large force has been employed on the premises, and the buildings now begin to loom up and afford an idea of the extent of the operations to be carried on in future in this hitherto barren locality.

The boiler, erecting, and machine-shops are in a brick building 200 x 175 .feet, which is in three parts. The building is 35 feet in height, and is surmounted by a lantern or ventilator running the full length of the roof. There are 10 tracks running into the building, 7 of them laid in the erecting shop, where all the locomotives for the road are to be built. The other 3 tracks are laid in the boiler-shop. Some of the most valuable machinery used in the trade is to be put up in these shops. The building will have a handsome slate roof, and when completed will be an ornament to the region.

At the extreme west end of the works is the round-house, which is in a fair way of completion. It is one of the largest buildings of its kind in this country, being 300 feet in diameter, and capable of holding 45 locomotives. The outside walls are 23 feet high, and the highest part of the roof is about 40 feet from the flooring. This building is also to have a slate roof surmounted by 22 cupolas. Piles were driven for each track as well as for the walls.

Near the southeast corner of the property is the blacksmith-shop. This building is 156 x 120 feet, and has three spans. The centre span rises to an elevation of about 35 feet, and is about 12 feet higher than the others. There are 3 ventilators running the length of the building. Inside there are 3 large hammers, whose foundations were built on oak piles driven 100 feet into the ground. There are to be 40 fires and 4 large furnaces. Like the others, this building has a slate roof, and at a distance is very imposing.

On the north of the erecting, boiler, and machine-shops is the planing-mill, a brick building, 136 x 70, and 35 feet in height. There is a track through the centre with planers on each side. The building has a slate roof and a ventilator. All the woodwork used in the construction of the locomotives and cars is to be planed here. Near this building is the stationary engine-house. The engine is of 300 horse-power. There are 6 boilers, 18 feet long and 5 feet in diameter. The main flue to the stack is 4 feet in diameter. There are 3 other flues 2 feet in diameter. The stack, which is shaped like a star, and was but recently begun, is to be 125 feet high, 13 feet in diameter at the base, and 8 feet at the top. The outside is of pressed brick, and the inside of fire-brick. There are flues for cooling the chimney from bottom to top. It rests on masonry built on 200 oak piles driven 65 feet into the ground, and is similar to to the stacks used by the company in Pennsylvania. There is none other like it in this part of the country.

On the east of the planing-mill and erecting-shop is the transfer-table track, which runs in a pit 480 feet in length by 60 in width. There are 25 side-tracks leading from the pit into the different shops.

West of this is the paint-shop for passenger-cars. This building is to be 402 x 137 feet, in three spans. Three ventilators running the length of the building will be put up. The spans are to be supported by iron columns resting on stone foundations, the columns serving also as leaders for carrying off water to the sewers, which, by the way, are perfect.

East of this building the foundation of an immense freight-car shop has been laid. The building, which will be used for the construction and repair of freight-cars, is to be 430 feet in diameter, and will set off to great advantage the cluster of edifices which has at its extreme west the great round-house. About forty tracks will be laid in the freight-car shop, which will be surmounted by twenty cupolas, and have iron trusses throughout. East of the paint-shop is a paint and varnish shop of brick, 110 x 35. An iron house north of the blacksmith shop, 60 x 110, to be used for storing iron, is in process of erection. North of the round-house is an oil and waste-house, 30 x 160. West of the round-house and between the two main tracks leading from it, is a sand-house, 60 x 30, where locomotives will be supplied with sand and water at the same time. The house has three apartments, one for wet sand, another for drying sand, and another for sand that has been dried. It is contemplated to put up another round-house near the one already erected, similar in size.

The space between the buildings and the main track (about 100 feet) will be filled with eighteen tracks running the full length of the tract owned by the company. The tracks will be used by the freight-cars coming east, and for what might be called the terminus of the freight business of the road. All freight trains will stop at this point, and the cars will be kept there until the freight is required in Jersey City, and then it will be drawn there by drill-engines. In this way the tracks in Jersey City will be kept clear, and much confusion and annoyance averted. The shops will be furnished with water from the main pipe which supplies Jersey City. A fine, large two-story building, surmounted by a great bell, is soon to be erected for a permanent office.

On the south side of the main track, and about a quarter of a mile from the Hackensack River, is the coal-wharf. This structure has probably puzzled the travelers over the road more than any thing else in the neighborhood, and many have been the purposes for which the curious have supposed that it was constructed. The wharf is 400 feet in length by 100 feet wide, and is intended to supply locomotives with coal. The coal will be taken to the platform in cars running up an inclined track, the gradation being about three feet to one hundred, and the track about one thousand feet in length, supported by trestle-work resting on piles. The wharf is built on piles, with bents ten feet apart and twenty feet high. At the east end is a heavily-built bridge crossing the main tracks (two main tracks are in course of construction, and added to the others will make four main tracks through to Philadelphia.) Coal will be taken from the platform in small cars on to this bridge, and dumped through a trap-door into the locomotive tenders on the tracks below.

This means of filling the tenders will, it is said, save the company about $200 a day, as at present the ordinary scoop is used and much time and labor are lost. All the trains will coal at this wharf. The wharf is about twenty-six feet above the surface of the meadow, and seventeen feet from the level of the track. There are two wide tracks or trestles running over the wharf. Cars from the mines of Pennsylvania are to be run up these tracks, and the coal is to be dumped on the wharf. There are three narrow-gauge tracks on the wharf for the cars to carry coal to the bridge.

From 125 to 150 car-loads of gravel are daily received from the company's grounds at East-Newark, and the land in the neighborhood of the shop is gradually assuming a healthy and firm appearance. About five hundred men have been almost constantly employed since August last in the construction of the buildings, which cover about 12 acres. Even in the extreme cold weather, the work was continued. When the shops are completed, about eight hundred men will be employed. It is said that the company will erect dwellings in the neighborhood for the workmen. Some of the laborers employed there now complain of chills and fever. The filling in will be continued until houses can be erected on hard ground, and then it is thought there will not be so much complaint. The natives are now satisfied that the Pennsylvania Railroad Company will not stop until the "meadows" have been made a healthy and thriving town.—*Condensed from the New-York Sun.*

Poor's Railway Manual.

WE have received from the publishers, H. V. & H. W. Poor, a copy of their *Railway Manual* for 1873–74. It is similar in appearance, and in the arrangement and character of its contents, to its predecessors, with the exception of an increase in size. That portion of the volume devoted to the history, organization, financial condition, etc., of individual roads, occupies 739 pages. In addition to this, there are 165 pages devoted to advertisements and miscellaneous matter, including a number of valuable statistical tables, showing the progress, mileage, cost, equipment, traffic, earnings, and debt of the various roads; also a statement of the street railroads of New-York, Massachusetts, and Pennsylvania; the condition and traffic of the New-York State canals; Congressional land-grants to railroads; the existing debt of the United States; and the debts and liabilities of the several States.

In our last issue we copied a portion of the introduction, showing the comparative condition and progress of railways in the great geographical sections of the country, and we now give the total amount of rolling-stock, which foots up as follows: locomotives, 12,530; passenger, baggage, and mail-cars, 11,653; and freight-cars, 292,654. The States having the largest number are

	Locomotives.	Pass. Train Cars.	Freight Train Cars.
New-York	1429	1658	31,929
Pennsylvania	2076	1648	94,113
Massachusetts	676	1171	11,974
Ohio	1519	993	36,231
Illinois	1247	992	27,539
Indiana	815	573	15,240

According to the table from which these aggregates are taken, none but 8-wheel cars are included; so that, in order to get at the total number of cars of all classes, we must add to the above all others that have more or less than 8 wheels. We are inclined to think, however, that these are included in the statement, as we very much doubt that the State of Pennsylvania has 94,113 8-wheel cars, while we know that the roads within its limits have a vast number of 4-wheel coal-cars, and a large number of 12-wheel passenger-cars.

The tables showing the results of operation, financial condition, and other important details, have been compiled from reports made to stockholders and to State authority, and are more reliable than they have been in years past, on account of the greater willingness of the companies to furnish information, and the larger number of State bureaus to which roads are required by law to render periodical statements. The great difficulty in obtaining reliable information in cases where roads are not compelled to publish annual reports, makes it impossible to construct tables that will be entirely accurate. A fair approximation is all that the most industrious compiler can be expected to accomplish, until railroads are subject to more stringent legal supervision than the majority of them now are.

The current volume is the sixth one of the series, and contains a vast quantity of information indispensable to railroad men and the business community generally.

AT the trials of steam boilers at Sandy Hook this fall, the experimenters will be provided with bomb-proofs, so that observations may be taken almost instantly after an explosion. It is hoped to establish by these experiments the comparative value of iron and steel boiler-plates, of different plans of fastening plates, the efficiency of special plans for preventing explosions, and of registering apparatus, etc.

Improved Grain-Car Door.

THE cuts represent an improved door for grain-cars of which Thomas A. Bissell and Robert Miller are the patentees. Although designed more especially for grain-cars, it may be applied to any style of freight-car in which grain can be carried, without lessening in any degree their capacity for ordinary purposes.

Fig. 1 is a vertical longitudinal section of a car, showing the application of the door as seen from the inside. C represents the usual opening for receiving or discharging grain or other freight. The dotted lines show the position of the door when partly open, and the circular dotted lines show its movement when being opened and closed. It is set or hung edgewise, and moves vertically upon a pivot centrally located at one end; and in order that it may bear closely against its frame to prevent the escape of grain, and to provide also against the effect of expansion or shrinkage from moisture or extreme heat, a spiral spring is placed around the pivotal bolt F, as shown in Fig. 4, a recess being provided for the same in the door-post E E. This spring holds the door against the inner face of the post at all times, and thus takes up any contraction or expansion that may occur. B, Fig. 4, represents the car side, D the door, E E the door-post, F the pivotal bolt, P a metal cap to protect the head of the bolt, G the spiral spring, *e e* the recess, and *f* the nut on end of bolt. The end of the door, when closed, fits into an iron shoe, as shown in Fig. 1, the curve of the shoe being slightly contracted at the lower end, so as to secure a close fit. For grain and stock cars, the door is pivoted one or two inches above its vertical centre, so that its edge, when opened, may rest upon a block above any obstruction of frozen filth. To give the door a little play in cases where it is too long for the height of the car, the hole for the passage of the bolt is lengthened, as shown in Fig. 5, and a pin placed near the bottom of the door-post, which engages with the corner of the door and presses it into position in the shoe. The pin also operates as a stop when the door is turned in either direction, by means of the notches *o o*, Fig. 5. The proportionate thickness of the door, as compared with that of the car-side or wall, is not correctly represented in Fig. 4, as it does not actually exceed two inches, or about two fifths the thickness of the car-side.

Fig. 6 shows a double door, constructed upon the same principle, and designed for use upon cars where the opening is so wide that a single door can not rotate without striking against the roof.

Figs. 2 and 7 are horizontal sections of a car with a part of the flooring, the former showing the application of the single, and the latter the double door. The detached figure 3, at the corner of Fig. 1, shows the method of fastening the door when closed.

The door has been in use for more than a year on 800 cars of the Chicago, Burlington, and Quincy Railroad, and only six of them have been replaced during that time; while during the month of June the road replaced 980 doors of the kind previously used. Other prominent Western roads have also adopted it as the most serviceable and economical grain-door in use.

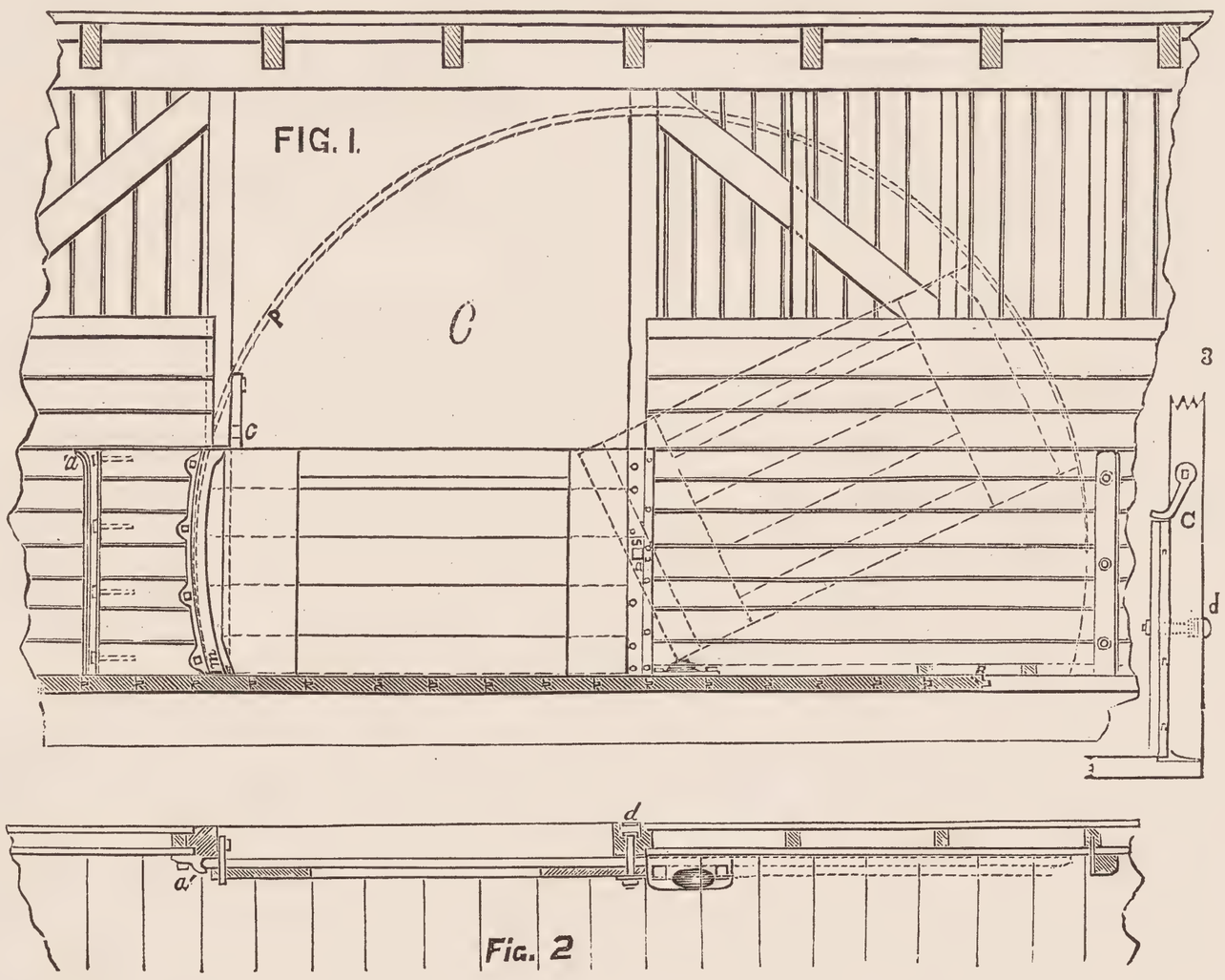
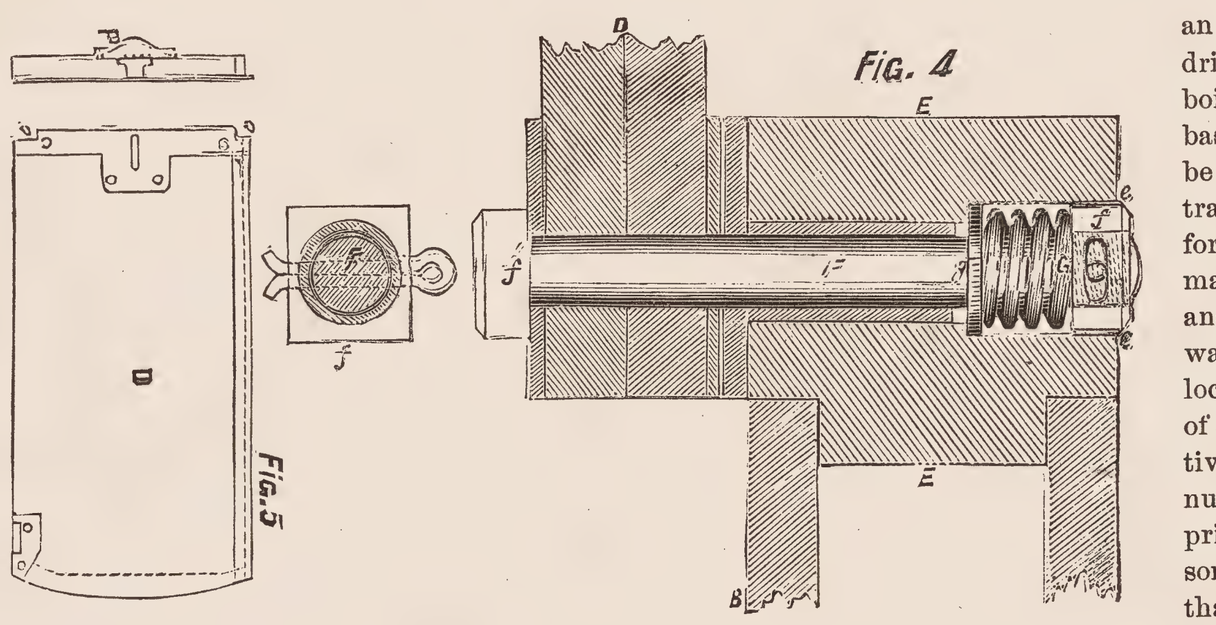
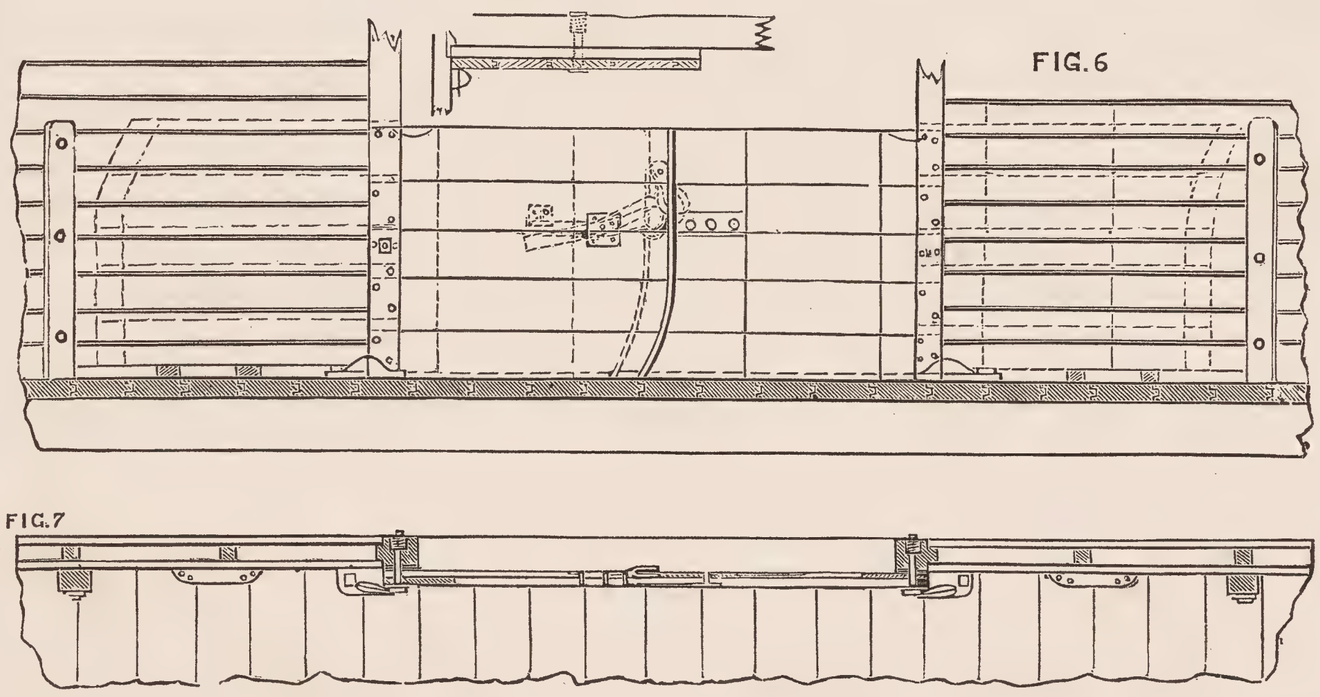


Fig. 2





Any additional information may be obtained by addressing D. F. Van Liew, Aurora, Ill., who is sole agent for the patentees.

CHICAGO now has railroad connection with Galveston and the gulf, the distance being 1244 miles.

Central Pacific Locomotives.

THE Sacramento (Cal.) *Record* thus describes the first of 12 new engines now being built in the shops at Sacramento:

"The boiler of this locomotive is 58 inches in diameter and contains 170 two-inch tubes of 11 feet 2 inches in length, and is itself made of Lake Superior iron three eighths of an inch in thickness, all its seams being double-riveted, and calculated to carry 140 pounds of steam to the square inch, ordinary service pressure. The boiler is fitted with a mud-drum underneath, into which the water to make steam is first ejected. By this ingenious arrangement, the sediment of the water is deposited below the tubes, and they are thus kept free from incrustations, and their durability considerably increased. This is an arrangement of the mud-drum which was never before made, and is due to the ingenuity of Mr. Stevens. The fire-box is made of Hussey & Wells' steel, $\frac{5}{8}$ of an inch thick. The cylinders are 17 inches in diameter, and the piston has 24 inches stroke. The driving-wheels are 4 feet 9 inches in diameter. Balance slide-valves are fitted to the machinery, by which the pressure is relieved and the friction greatly reduced. The fire-box is constructed with an offset, so as to admit of the back driving-wheels being set under the boiler, thus shortening the wheel-base, and enabling more weight to be thrown upon them, so that more tractive power is obtained. All the forging about the locomotive was made from the scrap-iron of the shops, and in this way a superior material was manufactured. The cab of the locomotive, constructed under the eye of J. Turner, foreman of the locomotive wood-shops, is made of black-walnut and the Mexican wood known as prima vera, making in all a very handsome finish. It is so constructed that all the joints can be taken up in a moment when shrinkage occurs. The tender-truck and its frames are all made of iron instead of wood, as is usual. The locomotives are designed by Mr. Stevens, the general master mechanic, and the drawings were made by Mr. George Stoddard, draftsman of the road.

THE new "Mogul" engine No. 427, belonging to the Baltimore and Ohio Railroad, on its trial trip took fifty loaded hoppers, containing 500 tons of coal, from Piedmont to Martinsburg, making schedule time—23 miles an hour—on the heaviest grade, the total weight of train being over 1,500,000 pounds. Returning, the same engine brought 100 empty hoppers, two cabooses, and a passenger-car. This engine was built by the Baldwin Locomotive Works, Philadelphia. Twenty-seven loaded hoppers is a full load for the most powerful "camel-back" engine.

Among the Shops.

THE RANLET CAR-WORKS.

On our way from the White Mountains, in the last week of July, we stopped at the thriving village of Laconia, situated at the outlet of Lake Winnipisiogee, the head of the Merrimack River, and the seat of a fine water-power. Here are located the shops of the Ranlet Manufacturing Company, one of the oldest establishments of its kind in New-England. Charles Ranlet began the building of cars here a quarter of a century ago, and continued the business until his decease. On the 1st of July, 1862, the present company was organized, consisting of John C. Moulton, Joseph Ranlet, and Perley Putnam, and the work of building freight-cars continued. At that time only two buildings were used—a wood-shop, 300 x 50, and a foundry, machine, and blacksmith-shop, 150 x 50. In 1865, another building was erected, 140 x 40, for constructing passenger-cars, and then followed the first work done in that line. Last season a shop, 130 x 50, and two stories high, with a cupola, was erected, and the present season a setting-up shop has been added, the dimensions of which are 50 x 85 feet. The shop and yards now cover about ten acres, are supplied by good water-power, and a stationary steam-engine to use in case of any failure of water. The company employ 225 men, and with their complete machinery, turn out one passenger-car and twenty freight-cars per week. In looking through the shops, we noticed the work was of a high order, both in the strength and quality of material used. Eleven cars in course of construction were supplied with the Miller platform. We found a new car in course of finishing, and intended for the Mt. Washington Railway—a very unique affair, with curtained sides, intended also as an observation-car, to run to the top of Mt. Washington on John E. Lyon's mountain railway. We forego a description of it, and advise all who may desire to see it to go next summer, or even this, if they have time, and ride to the top of this famous "hill," and see the railroad, engine, and cars. The Ranlet Company, having an extensive foundry, manufacture all their car-wheels and axles, using for the same the very best of material. They are now building four passenger, two baggage, and fifty freight-cars for the Montpelier and Wells River Railroad; two baggage and smoking, and twenty coal-dumpers for the Nashua, Acton, and Boston Railroad; fifty flats and fifty coal-dumpers for the Concord Railroad; and one passenger-car for the Ashburnham Branch. A new drawing-room car, the "Mount Washington," has just been delivered to the Boston, Concord, and Montreal Railroad, which is a model of beauty, and places Laconia mechanics in the front rank as car-builders. This company has also a steam saw-mill connected with the works, where all kinds of sawing are done; and they use the best of Georgia pine for car-bottoms, which is brought from Portsmouth, the nearest seaport, sixty miles distant.

THE PATTEN CAR-WORKS.

Our issue of last November contained a brief notice of these works, then just erected; but as we spent a day in Bath, during a recent visit to Maine, we are able to make some further mention of them and what they are doing. We found six passenger, and one baggage and postal-car in course of construction for the Maine Central Railroad; one baggage and two passenger-cars for the Portland and Ogdensburg Railroad, and an observation-car for the same road. This last-named car is forty-five feet long, with roof two feet narrower than the body of the car, and placed upon twenty-four supports made from galvanized iron tubing, one and one half inches in diameter. These supports rest upon the sides of the car, which rise about thirty inches from the floor; and as they bend in at the top so as to overcome the narrowness of the roof, furnish a good rest at the top for the curtain, which reaches the length of the car, sliding up and down on the standards by rings with which they are fastened. It is an easy task to raise the curtain to the rests, thus furnishing a fine unobstructed view of the surrounding scenery. This car is very neatly finished, its inner arrangements showing a desire to promote the convenience and comfort of the summer tourist. It is seated with thirty-six Wakefield cane-chairs, and will cost, when on the road, about $1700. It is to be placed upon the mountain division of the Portland and Ogdensburg Railroad, and used only in summer and during fair weather.

The Messrs. Patten are building a large number of freight-cars for various New-England roads, and their work can safely be set down as of the very best class. We noticed here also that every passenger-car in the works was being equipped with the Miller platform.

Wagner Sleeping and Drawing-Room Cars.

We were favored, a few days since, with an opportunity of inspecting a number of these coaches at the Grand Central Depot in this city, some of which are running on the Shore Line, and some on the New-York Central and Hudson River road. Taking the three or four cars to which our attention was particularly directed, as fair average specimens of this class of rolling-stock, there would seem to be but a narrow margin left for additional improvements in the way of promoting the comfort and convenience of the traveling public. These vehicles are in all respects first-class, being supplied throughout with all the requisites for safe and luxurious traveling which the skill of designer and artisan can suggest. Two of the sleeping-coaches, which run to Boston by the Shore Line route, and named respectively "City of New-Haven," and "City of Providence," are from the works of Gilbert, Bush & Co., of Troy. They run on six-wheel trucks, and are equipped with the Miller platform and coupler. The interior of each is finished in black-walnut, with raised panels of French walnut burl. The central saloons are divided into twelve sections, with upper and lower berths. The divisions or head-boards, are movable, and are packed away during the day so as to leave the body of the car unobstructed by any thing to suggest the idea of its being a sleeping apartment. The lunch and card-tables are also packed away when not wanted. There are two seats to each section, upholstered in crimson plush and facing each other. As a specimen of elaborate and costly ornamental work, we desire to notice the centre panels of the upper-berth sections, which are inlaid with a variety of rare woods, so skillfully and artistically done as to attract marked attention. This is ornamentation on a correct principle. Let it be good, honest, and genuine, what there is of it, and worthy of being looked at. The interior of a palace-coach is no place for trickery and painted deception. It may deceive for a moment the casual observer, but the occupants of the vehicle, during a journey of a hundred miles or more, have just that kind of kill-time leisure on their hands, to enable them to dissect make-believes of whatever sort, as well as appreciate and enjoy what is really and intrinsically excellent. We like to meet with such specimens of work in our cars as these inlaid panels; they are a credit to artist and designer, as well as a gratifying compliment to the artistic culture of the traveling community The head-linings are from the Howard manufactory, at Hartford, and in tone and color harmonize very well with their surroundings; but in beauty of design and the peculiar grace and delicacy of execution which characterize some linings we have seen, there is some margin for improvement. The cars are lighted with nine chandeliers manufactured by James L. Howard & Co. There are hood-ventilators at the end, and exhaust-ventilators in the roof. The windows are double. At each end of the car are state-rooms of the usual size for families; also lavatories with tanks and pumps; store-rooms and closets. The length of these coaches is 59 feet 5 inches, exclusive of platforms.

We also noticed an elegant drawing-room coach, called the "Narraganset," which also runs on the Shore Line road. It is 55 feet long, 13 ft. 6 in. high, and 9 ft. 8 in. wide, over all, and runs on four-wheel trucks. The central saloon has sixteen revolving chairs, upholstered in crimson plush. At one end of the car is a state-room seating eight persons, and two state-rooms at the other end seating four and two persons respectively. The heating and ventilating are the same as we have already described. The car is lighted by eight chandeliers. The windows are French plate-glass, 3 ft. 9 in. by 2 ft. 3 in. The mere mention of these details may be regarded as verging upon common-place, so familiar have the traveling public become with the luxurious equipments of first-class cars. Our object, however, in referring to these details, is to call attention to that class of rolling-stock constructed under the auspices and supervision of Mr. Wagner, as being fully up to the requirements of modern luxury. We would specially mention the following drawing-room coaches, now running on the Hudson River and New-York Central road, as being, in point of superior construction, design, and finish, equal to any vehicles of their class, namely, the "Empire," "Vanderbilt," "Red Jacket," "Palisade," "White Cloud," and "North Star." There are now running on the various roads in the United States and Canada, in the aggregate, 50 Wagner drawing-room coaches, and not less than 60 sleeping-coaches of the same class, of which Mr. Wagner is either the individual or joint owner.

Inclined Planes on Street Railroads.

The San Francisco *Bulletin* gives the following account of an inclined plane, now nearly finished, which is to give access to a section of that city which has heretofore been without street railroad facilities on account of the very high grades which must be used in order to reach it:

"The inclined plane, commencing at the corner of Clay and Kearney streets and ending at Clay and Jones streets, will be about 2800 feet long, and will overcome an elevation of over 300 feet. The stationary engine—25 horse-power—by which the cars will be drawn will be placed at the top of the hill. The wire-rope, which will be more than a mile in length, will be three inches in circumference, and made of the best steel wire. Light trucks or dummies will be employed on the grade, to which the cars will be attached while ascending and descending. To each truck is attached an ingenious apparatus by which the rope may be tightly clasped or released at will. The car may by this means be stopped or started by the conductor by a single turn of the wheel which controls the clasp. Three safeguards are provided to render the stoppage of the car practicable and safe. These are so arranged as to take hold of the pavement and support the weight of the car whenever necessary; each car is provided with a common brake which will alone hold it under ordinary circumstances. A third provision is made in the form of an iron shoe 28 inches in length, which is lowered to the track between the wheels, on which the whole weight of the car may be thrown by the conductor, raising the wheels entirely from the track. Each car will weigh about 1500 pounds, empty, and about double that with 16 or 18 passengers. Two ascending cars will be attached to the rope at once if one does not reach the top of the hill before another starts from the bottom. At the top of the hill a horse takes the place of the truck and the car is drawn over the remainder of the road."

The new car-works to be located at Swissvale, on the line of the Pennsylvania Railroad, about a mile east of Wilkinsburg, will occupy an area of thirteen acres. The ground is well adapted to the purpose, and is sufficient to accommodate a large business in the manufacture of cars.

The ground has been broken at Hartford, Ct., for the erection of the new car-factory and repair-shops for the New-York, New-Haven, and Hartford Railroad, which will double the present capacity of the works, and add about two hundred to the working force.

Fastening Iron Carlines.

THE cuts illustrate the iron carline used by the Harlan & Hollingsworth Company in the construction of their standard car-work. It is made of plain 2 x ½-inch bar-iron bent to the proper shape, as shown in Fig. 1. Care is taken to make the bends "easy," as sharp inside angles are points from which cracks are liable to start. As there are no welds or twists in the carline—which is a saving of blacksmith work—its edge must be directly upon the plate, and as this edge surface is so narrow as to be likely to cut into the wood without other support, the iron is placed between two wooden carlines, as shown in Fig. 3, which is a plan of the compound carline. The timber is usually oak or ash, the former being preferable at the above-named works, for the reason that an excellent quality of oak can be obtained in Delaware, while a good quality of ash can hardly be got at any price. The two pieces of wood take a bearing upon the plate, and as there are no rods going down to the sill, there is less need of a foot or palm on the iron, or of twisting the end. The full bearing of the compound carline upon the plate is 5⅝ x 3 inches. The wood is firmly bolted upon the iron by nine ⅝-bolts, which pass clear through from side to side, as is shown in Fig. 3. Two eye-bolts secure the carline in its place, going down diagonally through the plate, the nuts being on the outside, and screwed up till every thing takes a firm bearing. The feet of the wooden carlines are notched into the plate about half an inch, which prevents the eye-bolts from pulling them off, and at the same time secures them in a longitudinal position. In addition to this, a No. 18 wood-screw is put through each piece of wood, and secures them upon the top-plate, as shown. As in the carline illustrated in our last month's issue, the vertical or upright part of the iron passes up on the outside of the raised deck-wall, and is protected from the weather by sheet-lead. Sometimes the tin is bent around it, and a tight joint made by soldering—this and the paint being an ample protection for the iron. The projection of the deck-roof is usually made very large to prevent rain from entering the windows when open, and also to keep out the sun.

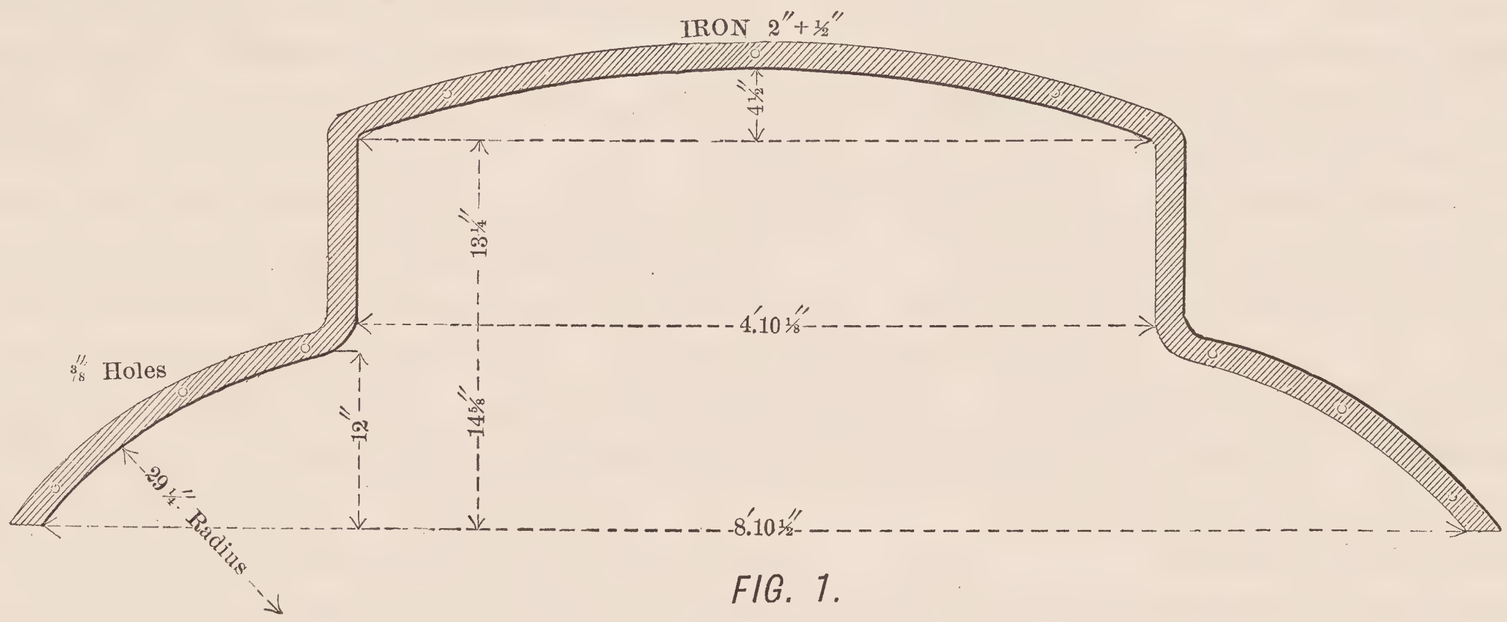


FIG. 1.

The framing of the deck-wall, which may be placed vertically or at an angle, is made continuous from end to end. The upper and lower members are usually single pieces, 1¼ or 1½-inch ash or Georgia pine, when they can be obtained of sufficient length, the former being about 2½ or 2¾ inches deep, and the latter 6 inches, and standing on edge. [See illustration in August number.] The upper ends of the wood carlines are mortised into the lower plate of the deck, and their under edges made flush with its bottom. The deep, three cornered lower sill in the deck is done away with, and the thickness of the deck wall made just sufficient to give strength without superfluous weight. The weight of such a deck-wall is probably but little more than half of what is necessary with some other plans, while its strength is increased.

The total width of the carlines at the foot is 8⅛ inches, which allows the foot to project inside of the plate 2½ inches, and to which projection a piece of furring is nailed. This strip is an inch thick, and is gained upon the rafters ⅝ of an inch; and as this is continuous, it forms a very desirable foundation for the finish, and for holding the lower edge of the headlining. Against this the moulding comes up and completes the finish. This is shown in section, Fig. 2. The radius of the curves and the various dimensions will be found in the drawings.

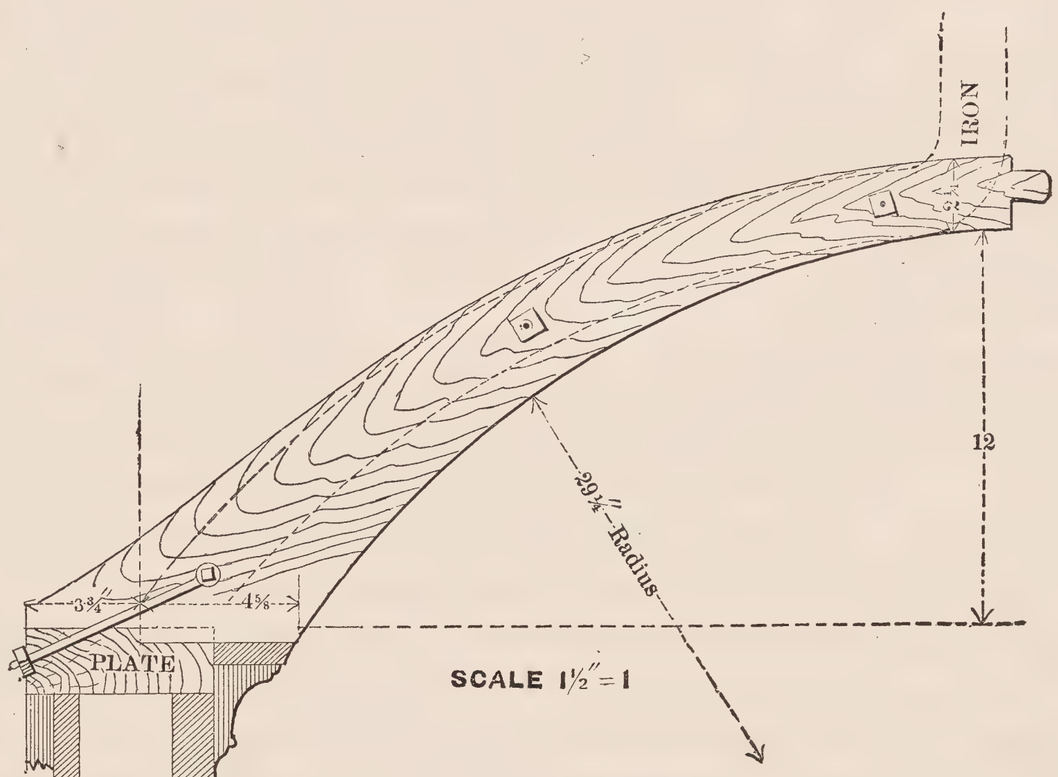


FIG. 2.

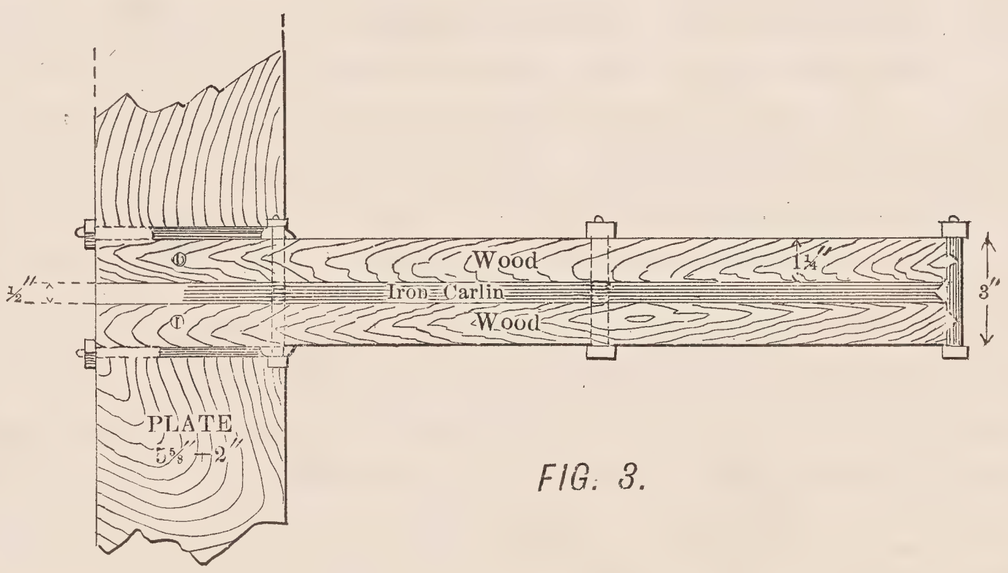


FIG. 3.

In this connection, we add a brief account, furnished by a correspondent, of the methods of fastening iron carlines employed by Mr. H. O. Wadlie, superintendent of the Illinois Central Railroad car-shops in Chicago. One method, used occasionally, is to forge the foot of the carline flat, without welding or twisting, and fasten it to the plate with two lag-screws. In some passenger-cars now being constructed, however, an iron carline, 2½ x ⅝ in the curved portions, is used; but across the deck, the width of the iron is increased to 3 inches, so as to give greater stiffness and prevent vibration. On each side is a piece of oak, 2½ x 1½, fastened to the iron by bolts running through. The end of the iron rests on the plate, and with the wood takes a bearing upon it. The wooden carlines are cut on their upper side, where they rest upon the outer plate, so as to form a kind of foot, and are fastened to the plate by four No. 16 wood-screws, two in each, slightly countersunk. The iron is not fastened at all, and need not be, as it is held firmly in place by the cross-bolts. The plate is of hard wood, 2¼ x 4 inches, and is slightly recessed to receive the foot of the carlines. The studding is tenoned into the plate with 1¼-inch tenons. The tie-rods are ⅝ at the ends, tapering to ½-inch at the centre. They pass through plate and sill, and have two-inch washers at each end.

THE Chicago, Rock Island, and Pacific Railroad, in addition to their splendid depot in Chicago, have also just completed a fine passenger depot at Rock Island, near the bridge. They are also building a new and commodious freight-depot and a large roundhouse for forty-two engines. The latter is 300 feet in diameter. A second track has just been completed between Fort Warren Junction and Colona, and men are now grading for and laying a second track between Morris and Seneca, which will be completed by the 1st of next month. Two miles of second track have also been completed east of Joliet. The company intend to gradually lay a second track along their entire line. They have also completed three new iron bridges, namely: One of 150 feet span, over Green River; one of 50 feet span, over Nettle Creek, and one of 150 feet span over Cedar River. Spring Creek they have spanned with a stone bridge of two arches 60 feet long. At Rock River Bridge, a new signal station has been erected and a second track laid. They have also in contemplation a new iron bridge, 100 feet long, over the Calumet River at Blue Island, to replace the present wooden structure. All these improvements have been made and are still carried on under the supervision of A. L. Mortimer, Chief Engineer of the Illinois Division. He is busy day and night preparing maps and plans.

IN order to provide for the large number of immigrants who now weekly pass westward over the Baltimore and Ohio Railroad, it has become necessary to build, at the shops at Mt. Clare, a number of passenger-cars intended solely for immigrants. The road is supplied to meet any emergency. The cars are not as elaborate in finish as the regular passenger-cars owned by the company, but in their construction every care has been taken to secure comfort and safety. The seats are roomy and well cushioned, and each car will comfortably seat seventy-two persons.

The National Car-Builder,

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BY

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JAMES GILLET, EDITOR.

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Editorial Announcements.

Correspondence.—*We cordially invite the coöperation of the railroad public in affording us the material for a good mechanical paper. Articles relating to rolling-stock and machinery, by those practically acquainted with those subjects, will be gratefully received. All communications must be addressed to Vose, Dinsmore & Co., No. 32 Warren Street.*

Advertising Rates.—*For one square, or one fifth of a column, $5 per month, or $50 a year. For half a square, $3 per month, or $25 a year. Larger advertisements by special contract.*

All communications in regard to advertising should be addressed to L. F. Dinsmore, *Post-Office Box* 4055, *New-York City, who is our agent for advertising, and authorized to make contracts, collections, etc.*

Engravings and Illustrations.

We would invite the attention of Master Car-Builders and others to the advantages to be derived from publishing in The National Car-Builder *engravings designed to illustrate the various features and details of car construction, and especially such improvements as can not otherwise be clearly presented. We will procure cuts to be made in the best manner from drawings or models that may be sent us, and charge only for the cost of engraving, inserting the same in our paper with suitable descriptive details, without charge.*

The Situation.

The reports of a large number of Western roads for the month of July show a very considerable increase of gross earnings as compared with those of the corresponding month of last year. This very gratifying result does not altogether harmonize with the desponding tone of sundry newspapers and correspondents for several weeks past, representing a serious falling off in the freight traffic of these roads, and indulging in gloomy predictions as to the future. If there has been a corresponding increase of net earnings—and we do not see why there should not be, in view of the rigid system of economy in current expenses, recently adopted—the prospect, as respects future business, is certainly a more cheerful one than we had reason to anticipate, and indicates that the bucolic uproar about discriminating freight-charges, has not made any very alarming inroads thus far on railroad prosperity at the West. These reports will no doubt have a favorable effect in a financial point of view, by restoring confidence among holders of stocks and bonds, of which there is at present special need. This, under the circumstances, is all very good; and although the gross earnings may continue to increase instead of diminish, it is not to be disguised that the financial condition of many roads at the West and elsewhere, is such as to cause apprehension, and necessitate the utmost economy in their management in order to lighten the heavy burden of indebtedness which weighs upon them. Recognizing the gravity of the situation, a check has been put upon the construction of extensions and feeders, purchases have been restricted to what is absolutely necessary, and the mechanical, train, and clerical force of many roads, very greatly reduced. A concerted movement has also been made for the abolition of free passes, which, if adhered to, will considerably diminish the aggregate of dead weight which, in one form or another, is such a burden on passenger traffic.

The necessity for this reduction of expenditure is no surprise to any one who has watched the railroad development of the country for a few years past. There has been a mania for new enterprises in excess of the requirements of trade and production, with little or no capital to sustain them when once started, except what might be obtained by discounting the future at high rates of interest. To use a nautical figure, the spread of canvas has been out of proportion to the ballast, causing a speed more or less hazardous to safe navigation. In order that the craft may again become trim and steady, the relative proportion must be restored, and that restoration will sooner or later be brought about in the regular course of things, and in obedience to established laws of finance and trade. The unproductiveness of Western roads, as compared with those in the more populous Eastern States, is accounted for, to some extent, by the excess of mileage to population. Their stocks and bonds are largely held by foreigners and non-residents, who are concerned only about the market value of their investments, and know and care little about the local interests, growth, and industrial development of the communities where such roads are located, so long as the securities they hold do not depreciate, and the semi-annual interest is promptly forthcoming. Capital, however, is proverbially sensitive; and the failure of numerous roads to pay the interest on their bonds has tightened the grip of investors, and caused a degree of financial distrust very unfavorable to new railroad schemes. The sudden rise in the price of iron more than a year ago has had the effect of retarding the progress of many projected roads whose capital was too slender to allow of any leeway for such contingencies. The antagonism between the railroads and the farmers is another element in the case, and a very troublesome one. The multiplication of roads in the fertile North-West has given a value to land more or less fictitious, and this has stimulated agricultural production to such a degree that the excess can not be transported to a distant market at a rate of freight mutually advantageous to producer and carrier; and, as the farmers can not avail themselves of any other means of transportation, they naturally conclude that railroads are grinding monopolies that need regulating. The fight, as it now stands, is a very interesting one; and as a good deal of each combatant remains undevoured, active hostilities will doubtless continue for some time longer, or until it is discovered that the relations of producer, carrier, and consumer, like the tides and atmospheric temperature, can not be permanently adjusted and regulated by statute. They are bound, in the long run, to regulate themselves, and thus maintain that equilibrium of interests which is the essential life of all industrial enterprise.

These complications will prove a wholesome check to new projects, and place the business of existing roads on a sounder basis. Their freight and passenger equipment must be kept up to meet the legitimate requirements of traffic; and so long as population increases, and industry is diversified, and land is cultivated, and wealth is sought after, this traffic is bound to increase in a steady ratio, and contribute to the permanent prosperity of our railroads, as well as all collateral industries. A vast quantity of rolling-stock is required to replace what is constantly wearing out; and this, in connection with the necessary repairing, is sufficient to keep existing car-shops busy, although it may not warrant a future increase in their numbers like that which has taken place within the past eighteen months. During this period, not less than thirty new car companies have been formed in various parts of the country, on the basis of a prospective demand for rolling-stock equal to that of the preceding year, with the additional ratio of increase corresponding with the annual increase of railroad construction. These additions, with the increased capicity of many of the older establishments and road shops, are fully adequate to supply any demand now existing, or which is likely to exist for one or two years to come.

Car-Coupling.

We do not know exactly how many patents have been issued for car-coupling devices, but if the records of the Patent Bureau were examined, the number would probably be found to reach five hundred. So far as the mechanical requirements of an effective coupler are concerned, no problem is apparently more simple. A vertical pin dropped through or lifted out of a horizontal link; or a pair of hooks that can be connected or disengaged as may be required, without sandwiching a human body between the cars, to be caught and crushed like an insect between the upper and nether millstone—this would seem to be about all there is of it. And yet, if the five hundred devices, more or less, were collected together for inspection by a committee of the most competent railway mechanics, it is doubtful if a single one could be selected and unanimously approved as combining all the conditions required for its safe and practical working as a coupler. Either the ingenuity of our inventors and the skilled mechanical intelligence of the country are incapable of mastering the problem, or our railway operators do not take interest enough in the matter to determine which is the best of these numerous devices, and adopt them in place of the bungling contrivances by which so many lives are sacrificed. Some of these inventions have real merit, but are unappreciated from sheer inability on the part of railway men to test and examine them in detail; and it seems to us that some organized plan might be devised with special reference to couplers, so that the merits of each and every invention could be definitely and authoritatively settled, thus relieving an army of patentees of the misery of suspense, and enabling railroads to avail themselves of the best apparatus thus far discovered. It is high time that some steps were taken to lessen the number of shocking casualties from car-coupling which are recorded with such monotonous frequency in the daily newspapers. If the railroads will take no concerted action in the matter, then it will be the duty of the State Legislatures to compel railroad corporations to make use of better and safer methods of coupling cars than many of them now do. This would of course be attended with some expense and inconvenience, but it would save the lives of hundreds of railroad employees.

The attention of the Master Car-Builder's Association was called to this subject during their recent meeting at Boston, and a committee was appointed to make a report at the next annual meeting. We hope the members of this committee will consider the subject of sufficient importance to justify their coming together for the purpose of conference and discussion, and that they will be prepared to present a report to the next meeting of the association that will lead to the adoption of some means for ascertaining which is the best coupler extant, regardless of the opinions of inventors, bummers, and blowers; and then we shall have taken the first step toward the adoption of a uniform coupler, or, at all events, something safer and better than many of those now in use.

Dead Weight.

The clamor for cheap transportation necessarily leads to a closer scrutiny of the innumerable items of expenditure in railway operation, with the view of stopping some of the many leaks which in the aggregate cause such a serious reduction of net earnings. A very large proportion of this aggregate consists of superfluous weight in rolling-stock, the hauling of which costs just as much as if it were paying freight. While dead weight is one of the indispensable conditions of railway transportation, and constitutes the basis on which it rests, it should as far as possible be confined to its proper limits, and not be permitted to form any part of the superstructure. The fine point in the problem is, to ascertain and define these limits. The relative proportion of paying freight and dead weight should be adjusted so as to give a maximum of one and a minimum of the other; and in order to do this, a great

many apparently insignificant details and particulars in the structure of cars must be carefully looked into, and especially the nature, quality, strength, and special adaptation of the various materials used. Many a piece of iron, inferior in quality, and heavier than it need be, finds its way into a car from a job-foundry which pays a big price for road-scrap for the privilege of selling it back to the road in the form of castings, at a nominally cheap figure, but in reality dear, the road usually getting exactly what it pays for, less the results of increased liability of breakage—a liability which no road can afford to incur. This truck-and-dicker process is well enough in ordinary trade, but it is productive of bad results when it enters very largely into railway equipment. Many a piece of timber also, carelessly selected, imperfectly seasoned, crooked-grained, and cheap, is worked into cars and becomes the source of future trouble and cost—a dead weight in more senses than one. We think it may safely be said that, as a rule, every piece of inferior wood or metal used in the construction of a car adds unnecessarily to its weight; and, on the other hand, the better the stock of which castings or other iron work are made, and the greater the care in selecting, seasoning, and applying to their special uses the various kinds of timber, the more the aggregate weight can be reduced without impairing the requisite strength. The modern buggy, and other vehicles built at our carriage shops, are illustrations of this. Their strength, lightness, and slender proportions, as compared with their predecessors of former days, are almost a marvel, and are due to the quality of the material and the skill with which it is utilized. Let the same principle be applied, as far as practicable, in car construction, and a vast quantity of dead weight may be got rid of. Every car-builder doubtless knows this quite as well as we do. Road managers also know it equally well; but they will not adopt or adhere to such a principle until it is forced upon them as a necessity and as a matter of sheer economy. Perhaps we ought to except a few here and there who are constitutionally conservative and timid, and naturally oppose any reduction in the weight and size of car-body timbers, for fear of multiplying the splinters in case two trains, running at full speed in opposite directions on the same track, should undertake to pass each other. In such an event, we do not imagine it would make much difference whether a car-body was two or three thousand pounds heavier or lighter, altough the lighter car would necessarily have less momentum, and collide with somewhat less force than a heavier one.

We do not intend these suggestions to be understood as a disapproval of the standard axle adopted at the recent car-builders' convention, nor do we urge the expediency of any reduction in the weight of running-gear or floor-framing that would lessen their strength in the smallest degree. The car-axle, and especially the journals, are the foundation of the house; and an increase in their size does not necessarily require a corresponding increase in the weight and dimensions of the car. A lighter car-body, without loss of strength, accommodates more paying freight—the weight on the journals remaining the same. The standard axle must vindicate itself. It stands upon its merits. It may be too heavy, and the journals too large. If so, the several roads—some of them leading trunk-lines—which have adopted it, will in due time find it out and discard it for something better.

Vernon's Railroad Manual.

THIS elaborate work, which Mr. Edward Vernon has for several months been engaged in compiling, will be ready for issue in a few days. So far as an idea of its appearance and arrangement can be formed from an inspection of the proof-sheets we have been permitted to examine, it will be a very attractive and comprehensive volume of railway information. The companies are arranged by States alphabetically, and can be referred to without an index. A history of each road is given, with detailed statements of capital, liabilities, expenses, equipment, and other particulars. That of the leading trunk-lines is very full and complete, judging from the space devoted to the Pennsylvania road and divisions, which covers sixteen pages. There is also a directory of railroad officers, classified into executive, transportation, and mechanical departments. Another valuable feature of the work will be maps of individual States or groups of States, and a large general railroad map. The book will contain over 700 pages, beautifully printed on tinted paper, the pages measuring 9 by 6 inches, exclusive of margin.

WE would once more request our readers to give us prompt notice of any corrections that should be made in our lists of master mechanics, car-builders, superintendents, and purchasing agents. Changes are constantly being made, and unless we are advised of the same by the parties interested, or by others, the proper corrections are not made as promptly as they should be. As the value of these directions consists in their accuracy, we hope every reader will assume the *rôle* of special correspondent of THE CAR-BUILDER, whenever he can aid us in making them more accurate.

THE publication of the Secretary's official report of proceedings of the Master Car-Builders' Association has been delayed several days in order to procure an engraving of the standard axle. The report is now in the binder's hands, and will be ready for distribution in a day or two. In our next issue, we hope to be able to give drawings of the standard oil-box and bearing, the patterns of which are now awaiting the final approval of the committee.

THE firm of Z. Cobb & Sons, of Chicago, have opened a branch house at Wilmington, Del., for the manufacture and sale of their patent elliptic steel springs for car-seats. The branch office will be in charge of Mr. H. B. Cobb, a member of the firm, who will give special attention to the prompt filling of orders.

THE Boston *Railway Chronicle* contains a well selected summary of general railway intelligence, special attention being given to items of local interest pertaining to New-England roads. It is issued weekly, and is beautifully printed on tinted paper. Price, $3 per annum; J. B. Whitney, editor and proprietor.

Miscellanous Items.

THE Winona and St. Peter's Railroad Company have just completed, at Winona, Minn., a brick car-shop and engine-house, the former 80 x 140, and the latter 12 x 24. The car-shop contains some new machinery, including a Daniel's planer, with a fifty-foot bed, from the manufactory of Richardson, Merriam & Co.; a band-saw made by Richards, Kelley & Co.; a boring and mortising machine, with auxiliary boring attachment, from the works of Lane, Bodley & Co.; and a Woodworth planer and matcher. The shop has four tracks. The upper part of the building has a cabinet and upholstery shop, and an office. The company are also erecting a wooden building, 28 x 40, for repairing cars, and have also added an extension to their machine-shop, making its total length 176 feet. The capacity of their round-house has also been increased to nineteen stalls. These improvements, except the brick-work, which was done by contract, have been made under the direction and supervision of Mr. H. L. Preston, the master car-builder.

WORK on the new depot of the Pennsylvania Railroad, in Jersey City, is progressing rapidly. The present depot is 300 x 100 feet, and has five tracks. The new one will be 600 feet long by 156 wide, exclusive of restaurant and ferry-houses, and have eight tracks, and five platforms 16 and 18 feet wide. The building will have three spans, the central one 84 feet wide, and one on each side 36 feet wide. The roof of the middle span will be 40 feet from the tracks, and the side-spans will be 36 feet high. Ample provision will be made for light and ventilation, and commodious waiting-rooms will be fitted up. New ferry-houses will also be built, and the slips increased from four to six, and extended 100 feet further into the river. The new structures, exclusive of ferry-houses, will cover four acres of ground. These improvements have been greatly needed for years past, as all who are accustomed to cross the North River at this point can testify.

THE Illinois Central Railroad is building, under the superintendence of Mr. H. O. Wadlie, the master car-builder, one passenger-car, one sleeper, one combined baggage and express, and one combined baggage and smoking car. All of them have Snow's patent cross-rocker bolsters and platforms, which add materially to the strength of the cars, and are said to be quite as effective as the Miller platform. The sills are all of the best Southern pine. The method of putting on the longitudinal truss-irons is deserving of mention. A plate 3 feet 9 inches long, 3 inches wide, and $\frac{3}{4}$ thick, tapered to half an inch, is placed under the sill about three feet from the end, with one end bearing against the body-transom. On top of the sill, over this, is another plate, and the two are bolted together with three $\frac{3}{4}$-inch, three $\frac{1}{2}$-inch, and one $\frac{5}{8}$-inch bolts, passing through the sill—the larger bolts being placed at the points of greatest strain. The truss-rod is connected with the plate by a knuckle-joint, and may be tightened by a buckle in the centre of the rod.

THE Brooks Locomotive Works, at Dunkirk, recently turned out a new locomotive called the "Jay Gould," for the New-Jersey Southern road, having 17x24 inch cylinders and driving-wheels 5 feet in diameter. This locomotive, which is intended for passenger service between Sandy Hook and Long Branch, is described as being very finely finished and ornamented. The cylinder casings, the dome casing, the bell and bell columns, the jacket bindings, and all the small brass work inside the cab are nickel-plated. Wherever possible, the iron work is polished, and the front of the smoke-box is ornamented with a head-piece representing a surf-bathing scene. The cab is of black-walnut, finely finished, and the painting on the engine is very fine. The tender is painted black, with the New-Jersey State arms on either side, and the name of the road in gold letters on the wings of the tank. The works now employ about 450 men, and turn out seven locomotives a month.

THE car shops of the Chicago, Burlington, and Quincy Railroad, at Aurora, some eight in number, were burned a few weeks ago, involving a loss, in buildings, machinery, and lumber, of about half a million of dollars. Since that time there has been much anxiety felt by the citizens as to whether the railroad company would rebuild. The plans, however, have been drawn, the ground staked out, and the contract for the erection of the new buildings let to Mr. A. Wallbaum. The buildings will be a blacksmith and boiler-shop 80 x 200 feet, a wood machinery shop 80 x 300 feet, a freight-shop 80 x 310, and a coach-shop the same size. They are all to be of brick, with 22 feet walls and iron truss-roof covered with slate. The car and coach-shops will each contain 14 tracks capable of containing 28 passenger-coaches or 56 freight-cars at one time. Other buildings of like magnitude will be commenced next spring.

THE Danbury and Norwalk Railroad has recently purchased two new and elegant passenger-cars, costing about $5000 each. This company has built at its own shops within the past year ten platform-cars, remodeled an old passenger-car at an expense of $1650, making it worth $4000, and spent about $2500 dollars in repairs on a locomotive which is now as good as new.

SOME one in Cincinnati has invented a new street-car which is described as follows:

"The body of the car is similar to that of the ordinary street-car. It has but one platform, with steps at either side, and is no higher than other cars. The front wheels, six feet in diameter, with a platform for the driver, are independent of the rest of the car, so far as can be while coupled to it, and turn just as the front wheels of a common carriage. The weight of the car, with its load, rests chiefly on the hind wheels, which tower up nine feet in diameter. The axles drop in such a way that the load is far below the centre of the wheels, and all danger of upsetting is avoided. The wheels are of iron and similar to the wheels of our fire-engines, with long brass hubs and two rows of spokes. The track of the front wheels is the same width as that of a common buggy, while that of the hind wheels is much more than the width of the car itself. This car does not require a tramway, the large diameter of the wheels being sufficient to overcome the resistance offered by the uneven surface of the street.

THE branch of the Canada Southern road between Toledo and Trenton is all laid, and, with the exception of some needed ballasting, is ready for the regular running of trains. From Trenton to Wyandotte, the road-bed is graded, and the cattle-guards in place, and from Wyandotte to Detroit the work of grading is nearly completed. From Trenton west, the track is laid a distance of 30 miles, reaching within 10 miles of Blissfield Junction. From Blissfield, the road is open west a distance of 26 miles to Fayette. It is expected that the gap of 10 miles east of the Junction will be completed shortly, making a distance of 66 miles of the main line ready for business west of the Detroit River. Their large ferry-boat "Transfer," built for ferrying cars across the river, will be ready to assume the duties of her position at an early date.

IT is expected that the line of the New-York, Boston, and Montreal Railroad between New-York and Tarrytown Heights, will be opened by September 1st, to accommodate local traffic. Connecting with this at High Bridge, will be a line of steamboats, touching at Harlem and points on the East River as far down as Wall street. It is not believed that much can be done in the way of through travel and freight this year. With the opening of next year, it is believed that the road will have been completed and equipped. Nothing has been done as yet toward breaking ground for the foundations of the Gilbert Elevated Railway, but the managers deny that the work has been abandoned, as has been rumored, and affirm that the steamers are only temporary, and that a portion, at least, of it will be in running order before the close of the year.

THE works of the Jackson & Woodin Manufacturing Company, at Berwick, Pa., consist of a foundry, machine-shop, smith-shops, erecting-shop, and saw-mills. Their business is the building of cars, including wheels. The foundry building is 85 x 208 ft., and contains six cupolas with a capacity to melt fifty tons of pig-iron per day. One hundred and fifty car-wheels are turned out per day, many of which are sold to other car-builders. In the erecting-shop, seven 8-wheel cars or fourteen 4-wheel cars are turned out per day. The saw-mills are located in Columbia and Luzerne counties, and their product is about 1,650,000 feet of lumber per annum. The company has a capital of $200,000, employs 400 hands, and does a business of $1,000,000 annually.

THE Wason Car-Works, of Chattanooga, Tenn., are approaching completion, and will be in operation in a few weeks. The works consist of an erecting-shop, 42x270 feet, carpenter-shop, (two stories and basement,) 60x125 feet; pattern-shop, 40x50 feet; boiler-shop and annealing-room, 50x110 feet; foundry, 60x145 feet; machine-shop and boiler-room, 40x80 feet; and blacksmith-shop, (18 forges,) 40 x 135 feet. These works will give employment to 500 hands.

THE record of railroad accidents for the year ending August 1st, as published in the *Railroad Gazette*, is as follows:

	Accidents.	Killed.	Injured.
August, 1872	63	15	49
September	71	24	102
October	90	29	104
November	103	37	114
December	112	42	133
January, 1873	178	40	199
February	133	25	126
March	112	18	98
April	101	23	82
May	79	10	113
June	90	12	104
July	90	18	119
Totals	1222	293	1343

A NEW ticket is about to be introduced on the Rensselaer and Saratoga Railroad, known as the "patent duplex drawback ticket." When a passenger enters a car without having purchased a ticket of the agent, extra fare is charged by the conductor. The latter gives the passenger a receipt for the entire amount on the drawback ticket. The passenger presents the ticket at any ticket agent's office and has the extra charge refunded.

THE Rhode Island Locomotive Works have built 155 locomotives for a single road, the Great Western. It has now on hand the orders for 112 engines for various roads, and has recently been obliged to refuse several applications for others. 900 men are employed in the establishment, and 12 locomotives are completed every month.

A stranger in a Detroit street-car, when asked for his fare, pulled off one of his shoes and drew up a fifty-cent note, remarking that if a little prudence on his part would prevent it, he didn't propose being left penniless in a strange city by having his pocket picked.

THE Mobile and Ohio Railroad Co. have laid, in a part of their track, a new light rail known as the patent angle iron. Trains are now passing over it, and, if the test proves successful, it will materially reduce the cost of construction of railroads.

THE Lake Shore and Michigan Southern Railway Company have just purchased 160 acres of ground near Cleveland for the purpose of erecting their shops and extending their yards. Work will be commenced at once upon the ground.

THE last 300 feet of the Boston and Albany freight-house at Springfield are nearly roofed in, and all the other workmen keep up with the masons. The office will be finished in a few weeks, and the whole building next month.

THE New-Hampshire Legislature has passed an act obliging railroad trains to stop 500 feet from the intersection of railroads crossing at grade, and placing the engineer under a penalty of $100, and the corporation under $200, for a violation of this law.

THE refrigerator car, invented by Superintendent G. W. Beach of the Naugatuck road, for conveying milk between Winsted and New-York, has proved an entire success, and not a single can of milk has been lost on it from souring during the season.

EVERY passenger engine on the Hartford, Providence, and Fishkill road, and nearly all its passenger-cars, are now fitted with the Smith patent vacuum brake.

THE Boston and Maine Railroad has just received another new parlor-car, No. 109, which will be put on the road at once These cars are very popular with travelers.

A. H. DE CLERCQ, for several years past master-mechanic of the Toledo, Peoria, and Warsaw Railroad, has resigned that position, and is succeeded by W. O. Hewitt, who has heretofore been foreman of the shops. On the occasion of his retirement, Mr. De Clercq was presented with a massive gold chain and a valuable diamond pin, by the engineers, firemen, and shopmen, as a token of their regard. He has already received the offer of two desirable positions.

GEORGE W. CUSHING has resigned the position of general master mechanic of the Northern Pacific Railroad, his resignation taking effect on the 15th ult., and has since been appointed master of machinery of the Toledo, Wabash, and Western Railroad, with headquarters at Fort Wayne. He will have charge of all the motive power and rolling stock of the company.

H. A. TOWNE has resigned the position of master-mechanic of the Hannibal and St. Joseph Railroad, and has accepted the appointment of superintendent of motive power of the Northern Pacific road, in place of George W. Cushing, resigned. His headquarters are at St. Paul. L. W. Towne has been appointed master-mechanic of the first-named road.

MR A. A. TALMAGE, Superintendent of the Atlantic and Pacific road, has ordered an immense area along the line of his road to be immediately planted with locusts, either from the seed or young trees. He intends to make this a permanent part of the business of the road and its employees in sections of country in which it is possible.

A. T. SANFORD, formerly of the Vandalia division of the St. Louis, Vandalia, and Terre Haute road, has been appointed master mechanic of the Indianapolis and St. Louis road, in place of William Barkla, resigned. Office and shops, at Mattoon, Ill.

COL. C. W. DOUBLEDAY has sold his elegantly-equipped sleeping and parlor-car lines to the Woodruff Company, of Philadelphia. Hereafter, Mr. Jonah Woodruff, the well-known sleeping-car patentee and proprietor, will have charge of the same.

MR. SILAS L. PIERCE, master-mechanic of the Peninsular Division of the Chicago and Northwestern Railway, and for many years identified with the interests of the road, died on the 12th ult., at his residence in Escanaba, Mich, after an illness of two months.

MR. HOWARD FRY, late master mechanic of the eastern portion of the Grand Trunk Railway, has been appointed to take charge of the locomotive department of the Erie Railway.

MR. GEORGE W. STEVENS has been appointed master mechanic of the Michigan Southern Division of the Lake Shore Railway, *vice* William Hill, resigned. Office and shop at Elkhart, Indiana.

H. W. Moore, inventor of the elastic car-wheel, and president of the Moore Car-wheel Company, of Jersey City, was thrown from his wagon while riding, on the evening of the 7th ult., and fatally injured.

C. F. ALLEN has resigned the position of general manager of the Pullman Palace-Car Works, at Detroit, and is succeeded by T. A. Bissell, who has for some time been superintendent of the same.

GEN. A. L. RUSSELL, of Harrisburg, has been elected president of the Allegheny Car and Transportation Company, whose works are in process of construction at Braddock's Field.

H. C. WHITING has resigned the position of master car-builder of the Hannibal and St. Joseph road, and is now general manager of the Hannibal Car-Works.

The Axle Question.

EDITOR OF THE NATIONAL CAR-BUILDER:

DEAR SIR: I would not trouble you again upon the axle question, but for the gross manner in which *Machinist* has misrepresented me in your last issue by saying I am opposed to any increase of journal diameter over 3¼ inches. This is wide of the truth, as may be seen by referring to my first communication, in which I distinctly stated that I had no objection to the journal recommended by the committee, (7 x 3½,) but to exceed that, would in my judgment, be a waste of material. This the writer of the article signed *Machinist* could not have been ignorant of. I am confirmed in the correctness of the opinion I then expressed, especially as it is so well sustained by mem-

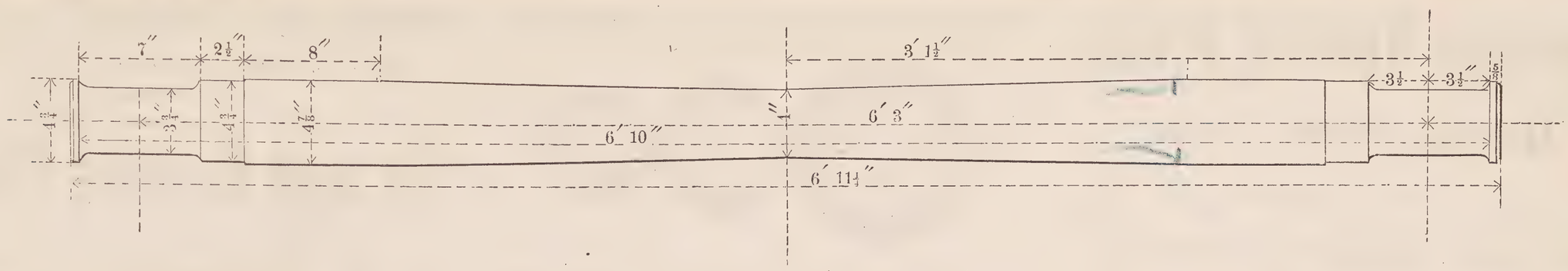

Diagram showing Finished Dimensions of Standard Axle adopted by the Master Car-Builders' Association, June 13, 1873.

bers of the late convention. Mr. Longest said his cars, with this size of axle, would carry 40 tons. Mr. Smith, of the Erie Railway, said his road adopted a 3½ journal in 1862, and abandoned it in 1867 for a 3¼, with more satisfactory results, which proves that the proper size for that road ought not to exceed 3½, a size which will certainly carry all any railroad can profitably afford to carry, all things considered; and if not with less friction at the bearing, certainly with less in reference to dead weight.

Machinist tries to make a point in favor of the big axle because of its less convexity, when the merest tyro in mechanics knows that the tendency of a convex body is motion, and that of a plane surface, rest. It would not require as good an expert in figures as this axle-turner, to show that the pressure per square inch on a 6-inch journal would be less than on one of 3½ inches; but a much better expert would be required to determine the former size out of the question, as his theory seems to be that the larger the surface the less is the friction; consequently, we may go on increasing the size until friction ceases altogether, which is a palpable absurdity. This is the kind of logic which *Machinist* and others would compel us to adopt, willing or unwilling. Mr. William Fairbairn, a scientific writer of world-wide reputation, and a very extensive manufacturer, says in his work entitled "Machinery of Transmission," (I quote from memory,) "I owe my success in life to the fact of having taken down all my heavy, and substituted light shafting, increasing its velocity nearly threefold." I am satisfied from all I have read on this subject, that every additional inch of surface, after we have attained sufficient strength, is not only useless, but must necessarily increase friction.

BUFFALO, August, 1873. G. G.

Publishers' Notices.

IMPROVED LOCOMOTIVE HOISTING MACHINE.—Those who build or repair locomotives, know how difficult it is to hoist such a ponderous weight, and how expensive is the outlay of time and labor required in doing it. In order to do this work more cheaply and expeditiously, machines are now being built by Messrs. Skinner & Griffith, of Dunkirk, N. Y., by means of which six men can accomplish as much in two hours, as eight men can without it in a whole day. One of these machines is in operation at the Erie Railway shops in Buffalo, and it is shown by actual figures, that by its use a saving of $13.86 is made in the lifting of one engine. This machine has been in operation since March, 1867, since which time 330 locomotives have been hoisted by it at an aggregate saving of $4573.80. The machines are also used by the same road at Hornellsville and Jersey City. They will lift an engine clear of the driving-wheels in from one to two hours, are not liable to get out of order, and can be safely and easily operated. They are not expensive, and will pay for themselves in a short time. No locomotive shop should be without one. See advertisement.

A NEW AND IMPROVED FROG.—Messrs. Skinner & Griffith, of Dunkirk, have for years given special attention to the subject of railway frogs; and the result of a wide practical experience has been the production of a frog which has been thoroughly tested by constant use for the past two years in places where upward of a hundred trains pass daily, and in no instance has there been any failure, nor is there any perceptible jar to the rolling stock in passing over them. This frog differs from all others in the form of the flange channel, which enables the flange to keep the latter clear of snow and ice in winter. This it invariably does. This graduating channel is also of such form that the wheel can not leave the wing-rail until well over the point, thus preventing any blow upon the rail, and avoiding the pounding which wears out so many frog-points. They are sold at less price than many others, and managers will do well to examine into their merits, by conferring with the proprietors as above.

DOYLE'S DIFFERENTIAL PULLEY-BLOCKS.—These blocks, with Hall's improved yokes attached, have the peculiar merit of not running down under any circumstances, nor can the chain get wedged in or twisted. One man can easily hoist a thousand pounds, and the block will hold the weight at any point. The yokes guide the chain at the point where it passes the sheaves, and prevent it from getting out of place. For lifting heavy weights with rapidity and ease, these blocks are invaluable. See advertisement on page 236.

GEORGE P. ROWELL & Co., 31 Park Row, conduct the largest advertising agency in the world. Their new Gazetteer and Newspaper Directory is a most useful volume for business men who desire to make advertising investments intelligently. They also publish a quarterly magazine containing a select list of newspapers, valuable hints and suggestions to advertisers, and also much miscellaneous reading. Price of Gazetteer, $3; Advertiser's Gazette, 25 cents a copy.

NIVER'S POLISHING FLUID.—This is an excellent preparation for cleaning and polishing gold, silver, and plated ware, and all fine metallic surfaces, mirrors, and plate-glass. Vose, Dinsmore & Co. are agents for its sale.

Facetiæ.

HEADS are of different shapes and sizes. They are full of notions. Large heads do not always hold the most. Some persons can tell just what a man is by the shape of his head. High heads are the best kind. Very knowing people are called long-headed. A fellow that won't stop for any thing or any body is called hot-headed. If he isn't quite so bright, they call him soft-headed; if he won't be coaxed nor turned, they call him pig-headed. Animals have very small heads. The heads of fools slant back. When your head is cut off you are beheaded. Our heads are all covered with hair except bald heads. There are other kinds of heads besides our heads. There are barrel-heads, heads of sermons—and some ministers used to have fifteen heads to one sermon; pin-heads; heads of cattle, as the farmer calls his cows and oxen; head winds; drum-heads; cabbage-heads; at loggerheads; come to a head; heads of chapters; head him off; head of the family, and go ahead—but first be sure you are right.

A CONDUCTOR on the Chicago and Alton road is reported as having forbidden honeymoon "billing and cooing." Observing a bridegroom's arm out of place, he forbade further demonstrations. "But I have a right to hug her," said John. "Not on a railroad,' said the conductor; "there is a law against all unjust discriminations on railroads, and as I haven't a woman for each man on the train to hug, your action is in violation of the law, and must be stopped."

THAT was a good though a rather severe pun which was made by a student in one of our theological seminaries (and he was not one of the brightest of the class, either) when he asked, "Why is Professor ——— the greatest revivalist of the age?" and on all "giving it up," said, "Because at the close of every sermon there is a 'great awakening.'"

DURING a recitation on natural history in one of our well-known colleges, a student, in the pursuit of knowledge concerning the habits of animals, said, "Professor, why does a cat, while eating, turn her head first one way and then the other?" "For the reason,' replied the professor, "that she can not turn it both ways at once."

THE young ladies of Waterbury are getting to be high-toned. "W-h-y, y-o-u o-l-d s-a-r-d-i-n-e! Is that you?" is the way one fair one saluted another one on the street, recently; and the angel in bustle and high heels meekly and poetically responded: "You bet! I'm your katydid every time!"

THE man who can't be happy unless his mother-in-law lives in the same house with him isn't a resident of New-York. He lives in Jersey City. He says she's the only woman who can tackle his wife successfully. They take up so much time jawing each other that he has a peaceful life.

THE most appalling case of deafness that we ever came across outside of an asylum was that of an old lady who lives just across the street from the navy-yard. The other day they fired a salute of twenty-one guns. The old lady was observed to start and listen as the last gun was fired, and then she exclaimed, "Come in!"

A FARMER'S daughter out West received a hairy poodle dog from a friend in New-York. The unsophisticated damsel wrote back thanking her friend for the present, and saying she found it very handy when tied to the end of a stick to clean windows with.

IT rained the other evening, and there was an entertainment. A young gentleman said to a young lady, "May I have the pleasure of protecting you with my umbrella?" "Andy," said she, with her round, expressive eyes looking full into his, "Put up your rag." We like to see people sociable.

ONE of our critical readers writes: "In your paper of last month is a joke, the point of which I can not see." That's all right. There is no point to it. The fact is, that we had so many jokes that we couldn't get points enough to go round.

A SHARP old gentleman travelling out West got a seat beside his wife in a car by requesting the young man who sat by her to "please watch that woman while he went into another car, as she had fits."

A LITTLE girl visiting Niagara with her father, and seeing the foam at the foot of the falls, exclaimed "Pa, how much soap it must take to make so many suds."

Charcoal Roofing Plates,

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AND ALL METALS NECESSARY FOR

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DEALER IN

LOCOMOTIVES

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RAILROAD CARS,

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RAILROAD TIES,

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Is acknowledged, wherever known, to be the

BEST AND CHEAPEST PAINT IN THE MARKET.

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ALBANY, N. Y., October 25, 1871.

GENTS.: Our Company have used your Metallic Paint for several years. For freight-cars, car-roofs, and buildings it has given us entire satisfaction. Yours, etc.,
M. H. ST. JOHN, Supply Agent.

WASON MANUFACTURING COMPANY,
RAILWAY CARS, CAR WHEELS, AND RAILWAY CASTINGS,
SPRINGFIELD, MASS., October 4, 1871.

GENTS: We have used Prince's Metallic Paint exclusively for several years. If we did not believe it to be the best we would not use it. Yours truly, GEORGE C. FISK, Pres't.

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OUR OWN SPECIAL BRANDS OF SUPERIOR RAILWAY VARNISHES,

Are now used by some of the most extensive Railroads in the country, and are particularly recommended.

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Barney & Smith Manufacturing Co.....Dayton, Ohio.
Baker, Jackson & Co.....Latrobe, Pa.
Bellefonte Car Manufacturing Co.....Bellefonte, Pa.
Billmeyer & Smalls.....York, Pa.
Bradley, Osgood.....Worcester, Mass.
Bridgeport Car-Works.....Bridgeport, Pa.
Brill, J. G. & Co.....Philadelphia, Pa.
Bitner, George W.....Pittsburg, Pa.
Buffalo Car Co.....Buffalo, N. Y.
Canada Car Co .....Toronto, Canada.
Canada Steam-Engine Co.....Kingston, Canada.
Canda, F. E & Co.....Chicago, Ill.
Cartersville Car Co .....Cartersville, Ga.
Central Car & Manufacturing Co.....Jackson, Mich.
Clendenning, W. W.....Montreal.
Cummings Car-Works.....Jersey City, N. J.
Connellsville Machine and Car Co.....Connellsville, Pa.
Corunna Car Co.....Corunna, Mich.
De Pere Iron-Works.....De Pere, Wis.
Detroit Car-Works.....Detroit, Mich.
Detroit Car and Manufacturing Co.....Detroit, Mich.
Dawson Manufacturing Co.....Dawson, Ga.
Dickey, Neill & Co.....Toronto.
Dickson Manufacturing Co.....Scranton, Pa.
Erie Car-Works.....Erie, Pa.
Elmira Car-Works.....Elmira, N. Y.
Frederick & Co.....Catasauqua, Pa.
Freas Brothers & Thornton.....Berwick, Pa.
Fremont Car Co.....Fremont, Ohio.
Gardner, F. & Co. .....Carlisle, Pa.
Gill, John L.....Columbus, Ohio.
Gilbert, Bush & Co.....Troy, N. Y.
Goold, James & Co.....Albany, N. Y.
Goodrich Car Co.....Augusta, Ga.
Hannibal Car Works.....Hannibal, Mo.
Haskell & Barker Car Co.....Michigan City, Ind.
Harrisburg Car Manufacturing Co.....Harrisburg, Pa.
Heathcote, Herbst & Co.....Glen Rock, Pa.
Hamilton, William & Son.....Toronto.
Harlan & Hollingsworth Co.....Wilmington, Del.
Herrick Car-Works.....Oswego, N. Y.
Huntingdon Car-Works.....Huntingdon, Pa.
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Indianapolis Car Co.....Indianapolis, Ind.
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Keith, H. T. & I. N.....W. Sandwich, Mass.
Laporte Car Manufacturing Co.....Laporte, Ind.
Lombard, Thomas.....Augusta, Me.
Lebanon Manufacturing Co.....Lebanon, Pa.
Lehigh Car Manufacturing Co.....Stemton, Pa.
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Mansfield Machine-Works.....Mansfield, Ohio.
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McNairy, Claflen & Co.....Cleveland, Ohio.
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Missouri Car and Foundry Co.....St. Louis, Mo.
New-Haven Car Co.....New-Haven, Ct.
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Northumberland Car & Mfg. Co.....Northumberland, Pa.
Ohio Falls Car Co.....Jeffersonville, Ind
Ontario Car Co.....London, Ont.
Patten Car-Works.....Bath, Maine.
Peabody & Crangle Bro's .....Calais, Me.
Peters, Simon.....Quebec.
Piqua Car and Agricultural Works.....Piqua, Ohio.
Pittsburg and McKeesport Car Co.....McKeesport, Pa.
Pittsburg Car and Locomotive Co .....Pittsburg, Pa.
Portland Co.....Portland, Me.
Pullman Car Co.....Chicago.
Peregoy, J. H .....Houston, Texas.
Ranlet Car Manufacturing Co.....Laconia, N. H.
Russell & Co .....Massillon, Ohio.
Sands, William L.....Pottstown, Pa.
Schoharie Machine Co.....Schoharie, N. Y.
Schall, Michael.....York, Pa.
Shaaber & Johnston.....Reading, Pa.
Southern Car-Works. .....Independence, La.
South-Western Car Co.....Jeffersonville, Ind.
Shoenberger & Bryant.....Duluth, Minn.
Seath & Hager.....Terre Haute, Ind.
St. Charles Manufacturing Co.....St. Charles, Mo.
Stephenson, John & Co.....New-York, N. Y.
Taunton Car Co.....Taunton, Mass
Tredegar Co .....Richmond, Va.
Tiffin Car-Works.....Tiffin, Ohio.
Vigo Foundry and Terre Haute Car-WorksTerre Haute, Ind.
Watsontown Car Co.....Watsontown, Pa.
Wharton, Thomas J.....Brunswick, Ga.
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Davenport, Fairbairn & Co.....Erie, Pa.
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Fulton Foundry Co.....Cleveland, Ohio.
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Green, D. P. & Co.....St. Louis, Mo.
Hamtramck Car-Wheel Works.....Detroit, Mich.
Haskell & Barker Car Co .....Michigan City, Ind.
Harrisburg Car Manufacturing Co.....Harrisburg, Pa.
Heartt, Jonas S. & Co.....Troy, N. Y.
Jackson & Woodin.....Berwick, Pa.
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Lehigh Car-Wheel & Axle Works.....Catasauqua, Pa.
Lobdell Car-Wheel Works.....Wilmington, Del.
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Ohio Falls Car Co.....Jeffersonville, Ind.
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Sterling Car-Wheel Foundry.....Columbus, Ohio.
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Dickson Manufacturing Co.....Scranton, Pa.
Grant Locomotive Works.....Paterson, N. J.
Hinckley Locomotive Works.....Boston, Mass.
Manchester Locomotive Works.....Manchester, N. H.
Mason, William.....Taunton, Mass.
McKay Iron and Locomotive Works.....Jersey City, N. J.
Portland Company.....Portland, Me.
Porter, Bell & Co. (light locomotives).....Pittsburg, Pa.
Pittsburg Locomotive Works.....Pittsburg, Pa.
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The National Car-Builder has been printed from the commencement in this office. See also, for Illustrated Work, THE HUB, O NOVO MUNDO, LA AMERICA ILUSTRADA, HEARTH AND HOME, AMERICAN AGRICULTURIST, etc.

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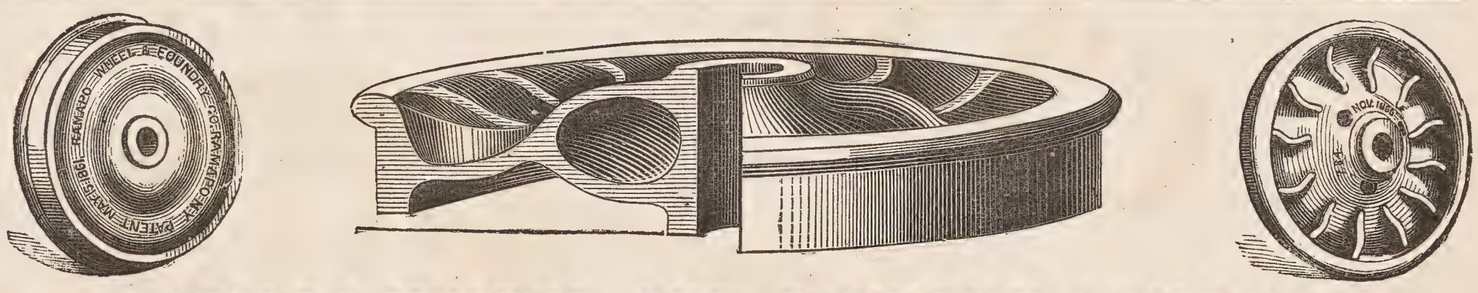

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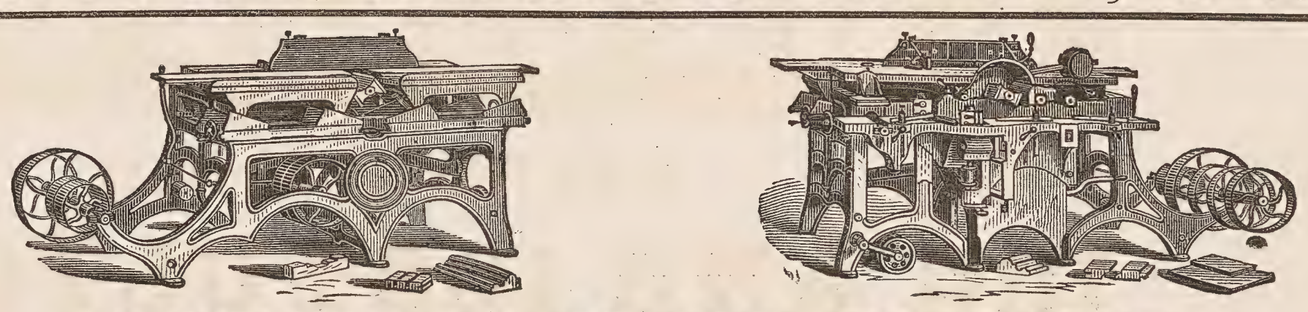

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Alabama Central	E. M. Smith	E. M. Smith	Selma, Ala.
Albany & Susquehanna	R. C. Blackall	R. C. Blackall	Albany, N. Y.
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Atlanta & West-Point	R. D. Cole	R. D. Cole	Newnan, Ga.
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Atlantic & North-Carolina	E. J. Clayton	E. J. Clayton	New-Berne, N. C.
Atlantic & Great Western	‡B. H. Kidder	††J. H. F. Wiers	Meadville, Pa.
Atlantic & Great Western	William Fuller	D. S. Dockstader	Meadville, Pa.
Atlantic & Great Western	N. Wright	W. G. Haggard	Cleveland, Ohio.
Atlantic & Great Western	‖J. B. Miller.	S. V. Smith	Kent, Ohio.
Atlantic & Great Western	Allen Cook	J. W. Holmes	Galion, Ohio.
Atlantic & Pacific	§John Hewitt	E. Martin	St. Louis, Mo.
Atlantic, Mississippi & Ohio			
Norfolk & Petersburg Division	J. S. Whitworth	J. S. Whitworth	Norfolk, Va.
South-Side of Virginia "	J. T. Robinett	J. T. Robinett	Petersburg, Va.
Virginia & Tennessee "	F. Sterk	W. A. Morgan	Lynchburg, Va.
Virginia & Kentucky "			
Allegheny Valley	G. W. Glass	R. Gunning	Pittsburg, Pa.
Androscoggin	Ira K. Russell	C. S. Greenwood	Farmington, Maine.
Adirondack	Jacob Myers	James J. Traver	Saratoga, N. Y.
B			
Baltimore & Ohio	§John C. Davis	J. S. Shryack.	Baltimore, Md.
Baltimore & Ohio		James H. Miller	Baltimore, Md.
Baltimore & Ohio	Wm. Edwards		Martinsburg, Va.
Baltimore & Ohio	A. J. Cromwell		Piedmont, Va.
Baltimore & Ohio	E. W. Lippencott		Grafton, W. Va.
Baltimore & Ohio			Wheeling, W. Va.
Central Ohio Division	Alex. Platt		Zanesville, Ohio.
S'dusky, Mans., & New'k Div.	Wm. Y. Johnson		Sandusky, Ohio.
Bangor, Old Town & Milford	J. B. Peckham	John H. Brown	Bangor, Maine.
Bangor & Piscataquis	Horace Penny	J. W. Comins	Old Town, Maine.
Bellefonte & Snow Shoe.	H. D. Landis	H. D. Landis	Bellefonte, Pa.
Belvidere Delaware	R. McDowell	John Silvers	Lambertville, N. J.
Boston & Albany	Wilson Eddy	F. D. Adams	Springfield, Mass.
Boston & Albany	A. B. Underhill	W.E.Chamberlain	Allston, Mass.
Boston & Providence	George Richards.	John Lightner	Roxbury, Mass.
Boston, Clinton & Fitchburg	John Webster	Samuel Stevens	Fitchburg, Mass.
Boston, Concord & Montreal	Ralph Adams	M. R. Elkins	Lake Village, N. H.
Boston & Maine	F. A. Waitt		Boston, Mass.
Boston & Maine		D. C. Richardson	Lawrence, Mass.
Boston, Lowell & Nashua	J. F. Crockett	T. G. Davis	Boston, Mass.
Boston, Lowell & Nashua		S. A. Davis	Nashua, N. H.
Blossburg & Corning	O. C. Patchell	O. C. Patchell	Corning, N. Y.
Brockville & Ottawa	H. J. Marshall	H. J. Marshall	Brockville, Can.
Blue Ridge			Anderson, S. C.
Burlington & Missouri River	J. Christiansen		Plattsmouth, Neb.
Burlington, Cedar Rapids & Minn	R. W. Bushnell	W. F. Kittridge	Cedar Rapids, Iowa.
Buffalo, New-York & Phila	Allen Vail		Buffalo, N. Y.
Buffalo, Corry & Pittsburg	Thomas Connell	Thomas Connell	Corry, Pa.
C			
Cairo & Fulton	L. Finlay	L. Finlay	Little Rock, Ark.
California Pacific	A. J. Stevens	D. Rutherford	Vallejo, Cal.
Camden & Amboy	F. B. Stevens		Hoboken.
	T. T. Kerr	E. Lockwood	Bordentown, N. J.
	Thomas Single		South-Amboy.
Camden & Atlantic	Rufus Hill	S. Wills	Camden, N. J.
Canada Southern	C. E. Benton	C. E. Benton	St. Thomas, Canada.
Carolina Central	W. A. Gill	Thos Myers	Laurinburg, N. C.
Catawissa	A. J. Prescott	C. D. Ellis	Catawissa, Pa.
Catasauqua & Fogelsville	Thomas Evans	Chas. J. Holbach	Catasauqua, Pa.
Carrolton & Oneida	M. T. Wiggins		Carrolton, Ohio.
Charleston & Savannah	H. T. Calder		Charleston, S. C.
Chesapeake & Ohio.	W. G. Freeman	J. N. King	Richmond, Va.
Chesapeake & Ohio	§T. J. Hamer		Huntingdon, W.Va.
Cheraw & Darlington	D. W. Haines	A. M. Corrie	Florence, S. C.
Champlain Trans. Co.	H. T. Calder		Burlington, Vt.
Cheshire & Ashuelot	F. A. Perry	F. A. Perry	Keene, N. H.
Charlotte, Columbia & Augusta	Robert King	J. Q. Seats	Columbia, S. C.
Chicago & North-western	§Geo. W. Tilton	Thomas Hull	Chicago, Ill.
Wiscon. Mad. & Mill. Divis		Henry Hull	Fond du Lac, Wis.
Galena Division	D. Manning	Hugh Gray	Chicago, Ill.
Wiscon. Mad. & Mill. Divis	T. B. Tilton		Chicago, Ill.
Iowa Division	C. C. Elliott	William Campbell	Clinton, Iowa.
Peninsula Division			Escanaba, Mich.
Chicago & Alton	John A Jackman	R. Reniff	Bloomington, Ill.
Chicago, Burlington & Quincy	‡Geo. Chalender		Burlington, Iowa.
Eastern & Middle Division	E. T. Prindle	W. W. Wilcox	Aurora, Ill.
Galesburg Division	Wm. Wilson		Galesburg, Ill.
Quincy Division	Joel West		Cresson, Iowa.
Burlington Division	S. E. Burtch		Burlington, Iowa.
Buda Division	P. R. Sutton		Buda, Ill.
Chicago, Clinton & Dubuque	P. R. Sutton		Dubuque, Iowa.
Chicago, Dubuque & Minnesota	P. R. Sutton		Dubuque, Iowa.
Chicago, Rock Island & Pacific	T. B. Twombly	B. K. Verbryck	Chicago, Ill.
Chicago & Michigan Lake Shore	Wm. L. Fitch	Oliver Udell	St. Joseph, Mich.
Chicago, Danville & Vincennes	A. B. Bedell	W. H. Dunham,	Danville, Ill.
Chicago, Danville & Vincennes	J. M. Sanborn		Chicago, Ill.
Chicago & Canada Southern	§§J. Johann		Trenton, Mich.
Cincinnati, Wabash & Michigan	E. M. Porter		Wabash, Ind.
Cleveland, Col., Cin., & Indianapolis	‡L. S. Young	William F. Smith	Cleveland, Ohio.
Indianapolis Division	L. W. Durgin		Galion, Ohio.
Indianapolis Division		R. Attridge	Indianapolis, Ind.
Cincinnati Divison	D. Carmichael		Delaware, Ohio.
Columbus Division	F. G. Kaufholz		Cleveland, Ohio.
Cleveland and Pittsburg	N. E. Chapman	A. Steinbrunner	Cleveland, Ohio.
Cleveland, Mt Vernon & Delaware	J. W. Holloway	J. W. Holloway	Akron, Ohio.
Cincinnati, Hamilton & Dayton	William Cullen.	W. H. H. Allison	Cincinnati, Ohio.
Cincinnati & Indianapolis Junction	W. McKinzie	Edwin Beeny	Indianapolis, Ind.
Cincinnati, Lafayette & Chicago	Charles E. Gore		Lafayette, Ind.
Cincinnati & Muskingum Valley	Leroy Kells	Daniel Jewell	Lancaster, Ohio.
Cincinnati, Sandusky & Cleveland	John Y. Beattie	John Y. Beattie	Sandusky, Ohio.
Cobourg, Peterboro & Marmosa	Wm. Polson		Cobourg, Canada.
Columbus, Chicago & Indiana Central	(See Pitts. Cinn. & St. Louis)		
Concord	Chs. L. Eastman	M. W. Dickerman	Concord, N. H.
Concord & Portsmouth	C. L. Eastman	M.W. Dickerman	Concord, N. H.
Concord & Claremont	J. N. Lander	A. Langmaid	Concord, N. H.
Connecticut River	§Wm. H. Stearns.		Springfield, Mass.
Connecticut Valley	C. W. Hollister	N. A. Smith	Hartford. Ct.
Connecticut Western	N. Slingland		Hartford, Ct.
Contoocook River			Concord, N. H.

Railroad.	*Master-Mechanic.*	*Master Car-Builder.*	*Residence.*
Conn. & Passumpsic Rivers	Horace Alden	Horace Alden	Lyndon, Vt.
Cumberland Valley	A. S. Hull	C. W. NitterhouseChambersburg, Pa.	
Cumberland & Pennsylvania	W. L. Jordan	J W. Sauerbach	Mt. Savage, Md.
Central of Georgia		C. C. Millar.	Savannah, Ga
Central of New-Jersey	*T. W. Peeples	George Hackett	Elizabethport, N. J.
Lehigh & Susquehanna Div	L. C. Brastow	L. C. Brastow	Wilkesbarre, Pa.
Central Branch Union Pacific	Wm D. Rowley		Atchison, Kansas.
Central R. R. of Iowa	F. B. Woodruff	T. L. Seevers	Marshall, Iowa
Central Pacific	A. J. Stevens	Benjamin Welch	Sacramento, Cal.
D			
Dakota & Southern	Jas Whitney	A. A. Meckling	Sioux City, Iowa.
Davenport & St. Paul's	George Gregg		Peoria, Ill
Dayton & Union	A. J. Keenan	J. F. Feicht.	Dayton, Ohio.
Danbury & Norwalk	Charles A. Craig	C. A. Craig	Danbury, Ct.
Dayton & Michigan	William Cullen	W. H. H. Allison	Cincinnati, Ohio.
Denver & Rio Grande	John Greenwood		Denver, Col.
Delaware, Lackawanna & Western	Walter Dawson	Robert McKenna	Scranton Pa
Morris & Essex Division	W. H. Lewis	L. S. Barber	Hoboken, N. J.
Des Moines Valley	James Lamb	R. E. Smith	Keokuk, Iowa.
Detroit, Ft. Wayne & Logansport	W. A. Carpenter		Bankers, Mich.
Detroit & Milwaukee	Andrew Wilson		Detroit, Mich.
Detroit, Lansing & Lake Michigan	Tho. G. Roberts		Detroit, Mich.
Delaware & Hudson Canal Co.	James Dickson	Thomas Orchard	Carbondale, Pa.
Rensselaer & Saratoga Div	John Dikeman		Troy, N. Y.
Dorchester & Delaware			Cambridge, Md.
Dubuque South-western	J. M. Smith	J. M. Smith	Farley, Iowa.
Dutchess & Columbia	W. G.Vanbuskirk	H. A. Webster	Fishkill, N. Y.
Dunkirk, Allegheny Val. & Pittsburg	J. C. Haggett	J. C. Haggett	Dunkirk, N. Y.
E			
Eastern		J. P. Somerby	Salem, Mass.
Eastern	John Thompson		East-Boston, Mass.
Eastern Kentucky	D. L. Weaver	D. L. Weaver	Riverton, Ky.
East-Tennessee & Virginia	Eli Hixon	Jos. Armbruster	Knoxville, Tenn.
East-Tennessee & Georgia	Eli Hixon		Knoxville, Tenn.
East Pennsylvania		Samuel Reeves	Reading, Pa
Elizabethtown and Paducah	W. D. Robb	T. A. Cordrey	Elizabethtown, Ky.
Erie Railway	‖‖M. E. Brown		Susquehanna, N. Y.
Erie Railway	James B. Gregg		Susquehanna, N. Y.
Erie Railway	H. L. Brown	C. A. Smith	Jersey City, N. J.
Erie Railway	J. G. Hubbard	M. Wilder	Buffalo, N. Y.
Erie Railway	W. E. Cooper	W. E. Cooper	Hornellsville, N. Y.
Erie Railway		W. E. Rutter	Elmira, N. Y
Evansville & Crawfordsville	John L. White	Joseph Stiker	Evansville, Ind.
Evansville. Henderson & Nashville	H. M. Smith	W. H. H. Price	Henderson, Ky.
European & North Am. (of Maine)	A. O. Bailey	J. H. Brown	Oldtown, Maine.
Erie & Pittsburg	G. J. Parkin	G. J. Parkin	Erie, Pa.
Evansville, Terre Haute & Chicago			Terre Haute, Ind.
F			
Flushing & North Side	Wm. La Suer		College Point, L. I.
Florida	Ezra Gray	G. Hernandez	Fernandina, Fla.
Flint & Pere Marquette	Sanford Keeler	Sanford Keeler	East-Saginaw, Mich.
Fitchburg	Geo. A. Cooledge	Enos Varney	Charlestown, Mass.
Fitchburg & Worcester	John Webster	Samuel Stevens	Fitchburg, Mass.
G			
Galveston, Harrisburg & San Antonio	Jno. G. Coulon		Galveston, Texas.
Gilman, Clinton & Springfield	W. B. McKenna		Springfield, Ill.
Grand Tower & Carbondale	Hugh Smith	Hugh Smith	Grand Tower, Ill.
Grand Trunk		Warren Noyes	Gorham, Me.
Grand Trunk	†Richard Eaton	J. W. W. McWood	Montreal, Canada.
Grand Trunk			Sherbrooke, Can.
Grand Trunk		B. J. Mitchell	Portland, Me.
Galveston, Houston & Henderson	Wm. Macbeth	Wm. Macbeth	Galveston, Texas.
Grand Rapids & Indiana	J. M. Boon		Fort Wayne, Ind.
Great Western of Canada	†Wm. A. Robinson	F. Childs	Hamilton, Canada.
Georgia	William Hardman	T. M. Preval	Augusta, Ga.
Green Bay & Lake Pepin	J. H. Erwin		Green Bay, Wis.
Greenville & Columbia	J. T. Price	J. T. Price	Helena, S. C.
H			
Harlem Extension	George W. Blanchard		Rutland, Vt.
Harlem Extension		C. S. Clapp	Bennington, Vt.
Hanover Branch	John J. Bingley	Henry Britcher	Hanover, Pa.
Hannibal & St. Joseph	L. W. Towne		Hannibal, Mo.
Hartford, Providence & Fishkill	Edwin Garfield	V. D. Perry	Hartford, Ct.
Hackensack & New-York	Abra'm Angausen		Hackensack, N. J.
Housatonic	C. R. Morris	J. J. Ferris	Bridgeport, Ct.
Houston & Texas Central	§W. H. Purdy	W. H. Purdy	Houston, Texas.
Houghton & Ontonagon			L'Anse, Mich.
Houston Tap & Brazoria	T. J. Shellhorn	T. J. Shellhorn	Houston, Texas.
Huntington & Broad-Top Mountain	J. Salisbury	M. Tellerhoof	Saxton, Pa.
Hempfield	T. Marsh		Wheeling, Va.
I			
Indianapolis, Cincinnati & Lafayette	J. S. Patterson	S. Griffith	Cincinnati, Ohio.
Indianapolis, Peru & Chicago	John McKenna	John McKenna	Peru, Ind.
Illinois Central	**S. J. Hayes	H. O. Wadlie	Chicago, Ill.
Chicago Division	Henry Schlacks		Chicago, Ill.
South Division	David Oxley		Centralia, Ill.
North Division	J. B. Edams.		Amboy, Ill
Iowa Division	Thomas W. Place		Waterloo, Iowa.
Iowa & Missouri State Line			Farmington,Iowa.
Iron	Perry Scott.	Clem. Roetling	Ironton, Ohio.
Indianapolis & St. Louis	A. T. Sanford	R. B. More	Mattoon, Ill.
Indianapolis. Bloomington & Western	Tho. V. Losee	A. J. Allen	Urbana, Ill.
Ionia & Lansing	H. Loughlin		Lansing, Mich.
Indianapolis & Vincennes	A. E. Allcott		Indianapolis, Ia.
International & Great Northern	T. J. Shellhorn	F. M. Looney	Houston, Texas.
Intercolonial	Wm. Whitney	Edw. Shaffer	Moncton, N. B.
Ithaca & Athens	F. A. Brown		Ithaca, N. Y.
J			
Jeffersonville, Madison & Indiana	Reuben Wells		Jeffersonville, Ind.
Junction & Breakwater	J. A. Maguire		Lewes, Del.
K			
Kansas Central	John Davis		Leavenworth, Kan.
Knox & Lincoln	§§E. R. Hamlin	Benj. Soule	Bath, Maine.
Kentucky Central	J. R. Ledyard	J. L. Hackathorn	Covington, Ky.
Knoxville & Charleston			Knoxville, Tenn.
Kansas Pacific	**L. H. Waugh		Wyandotte, Kansas.
Denver Pacific Div	**L. H. Waugh		Wyandotte, Kansas.
Denver & Boulder Valley Div	**L. H. Waugh		Wyandotte, Kansas.
Junction City & Ft.Kearney Div	**L. H. Waugh		Wyandotte, Kansas.
Arkansas Valley Div	**L. H. Waugh.		Wyandotte, Kansas.
Kalamazoo, Allegan & Grand Rapids			Kalamazoo, Mich.
Kansas City, St. Joseph & Council Bluff	H. L. Cooper	T. Aylesbury	St. Joseph, Mo.
King's Mountain	E. Thomas.	E. Thomas.	Chester, S. C.
L			
Lake Erie & Louisville	John Pero		Fremont, Ohio.
Lackawanna & Bloomsburg	Chas. Graham	Chas. Graham	Kingston, Pa.
Lehigh Valley	John I. Kinsey		South-Easton, Pa.
Lehigh Valley	P. Hofecker	E. R. Brown	Weatherly, Pa.
Lehigh Valley	A. Mitchell	Mauch Chunk, Pa.	Delano, Pa.
Lehigh Valley	D. Clark		Hazleton, Pa.
Leavenworth, Lawrence & Gal	S. M. Philbrick		Lawrence, Kansas.
Lexington & Big Sandy	Fred. Weber	R. Brainard	Ashland, Ky.
Little Rock & Fort Smith	D. R. Wing	D. R. Wing	Argenta, Ark.
Little Miami	J. H. Setchel		Cincinnati, Ohio.
London & Port Stanley			London, C. W.
Louisville, New-Albany & Chicago	Geo. Ruhlandt	Geo. Helfrich	New-Albany, Ind.
Long Island	Chs. A. Thompson	Ellis Dodge	Hunter's Point, L.I.
Louisville, Cincinnati & Lexington	E. B. Gibbs	S. S. Pilson	Louisville, Ky.

Railroad.	*Master-Mechanic.*	*Master-Car-Builder.*	*Residence.*
Louisville & Nashville	†Thatcher Perkins		Louisville, Ky.
Louisville & Nashville	D. P. Rennie	Isaac M. Owens	Louisville, Ky.
Louisville & Nashville	Jas. Montgomery		Bowling Green, Ky.
Nashville & Decatur Division	John Skidmore		Nashville, Tenn.
South & North Ala. Div.	Thos Jeffers	W. L. Gude	Birmingham, Ala.
South & North Ala. Div	C. H. Beale		Montgomery, Ala.
Memphis & Ohio Div.	Thos. Walsh	R. M. C. Parker	Memphis, Tenn.
Lake Shore & Michigan Southern	‡James Sedgley	††John Kirby	Cleveland, Ohio
Michigan Southern Division	Geo. W. Stevens		Elkhart, Ind.
" " "		S. S. Knapp	Adrian, Mich.
Toledo Division	Geo. H. Tier	Frank O. Bray	Norwalk, Ohio.
Erie Division	L. O. Gassett	J. Withyecombe	Cleveland Ohio.
Buffalo Division	W. L. Wallace	A. Robson	Buffalo, N. Y.
Lake Shore & Tuscarawas Valley	Charles Fellows	J. D. McIlwain	Black River, Ohio.
Lake Ontario Shore	J. C. Schermerhorn	J. C. Schermerhorn	Oswego, N. Y.
M			
Marquette, Houghton & Ontonagon	A. P. Burroughs	H. D. Lyons	Marquette, Mich.
Macon & Augusta			Macon, Ga.
Maine Central	J. W. Philbrick	C. H. Kenison	Waterville, Me.
Macon & Western	D. M. Gogul	James A. Knight	Macon, Ga
Manchester & Lawrence	Chas. L. Eastman	M. W. Dickerman	Concord, N. H.
Marietta & Pittsburg	W. J. Adams		Marietta, Ohio.
Maryland & Delaware	J. L. Caldwell		Easton, Md.
Macon & Brunswick	M. Thornton	M. Thornton	Macon, Ga.
Marietta & Cincinnati	E. Bosley	E. Bosley	Chillicothe, Ohio.
Memphis & Little Rock	Tho. Rennells	P. Twitchell	Argenta, Ark.
Memphis & Charleston	A. Ross	A W. Drew	Memphis, Tenn.
Memphis & Charleston	H. N. Burford	Fabien Varin	Huntsville, Ala.
Mineral Point	Robert Hay	Robert Hay	Mineral Point, Wis.
Mississippi & Tennessee	Geo. Haszinger	J. Riny	Memphis, Tenn.
Mississippi Central	Henry Gibbon	John E. Becton	Water Valley, Miss
Maryland & Delaware	Samuel Peters		Greensboro, Md.
Mississippi, Gains. & Tus			Gainsville, Ala.
Midland Pacific			Nebraska City, Neb.
Milwaukee & Northern		W. J. F. Liddell	De Pere, Wis.
Milwaukee & St. Paul	T. S. Davis	Wm. E. Kittredge	Milwaukee, Wis.
Milwaukee & St. Paul		John Baillie	Milwaukee, Wis.
Milwaukee & St. Paul	J. Pattee	D. F. Wilson	Minneapolis, Minn.
Hastings & Dakota Division	C. C. Clements		Hastings, Minn.
Michigan Central		J. B. Sutherland	Detroit, Mich.
Grand River Valley Division		James Potts	Jackson, Mich.
J'kson, Lans'g & Saginaw Div.	Andrew Wilson	Andrew Wilson	Jackson Mich.
Montgomery & West-Point	J. McVey	J. T. Daniels	Montgomery, Ala.
Montgomery & Eufaula	I. W. Hewlet	T. J. Burton	Montgomery, Ala.
Mobile & Montgomery	James McFarland	L. Barham	Montgomery, Ala.
Mobile & Girard	C. D. Wall		Girard, Ala.
Mobile & Ohio	L. J. Fleming / B. S. Skates	John McHugh / Jacob Huy	Mobile, Ala. / Whistler, Ala.
Morgan's Louisiana & Texas	N. Tilton	Wm. O'Brien	Algiers, La.
Missouri River, Fort Scott & Gulf	John S. McCrum		Kansas City, Mo.
Missouri River, Fort Scott & Gulf		Josiah Stahl	Wyandotte, Kan.
Missouri, Kansas & Texas		J. Townsend	Sedalia, Mo.
Missouri, Iowa & Nebraska	Wm. Adams		Alexandria, Mo.
N			
Nashville & Chattanooga	John U. Eastman	J. G. Sawyer	Nashville, Tenn.
New-Bedford & Taunton	Robert Chase	Robert Chase	New-Bedford, Mass.
New-Canaan			New-Canaan, Ct.
New-Brunswick & Canada	P. A. Logan	T. Armstrong	Fredericton, N. B.
New-Haven & Northampton	Henry Fox	Henry Fox	New-Haven, Ct.
New-York, Kingston & Syracuse	A. Q. Mackenbush	G. Dikeman	Syracuse, N. Y.
New-York & Harlem	Wm. M. Strong	Leander Garey	New-York.
New-York Central & Hudson River	‡G. B. Van Vorst		Albany, N. Y.
New-York Central & Hudson River	Henry Watkeys		Syracuse, N. Y.
New-York Central & Hudson River	Amos Gould		Rochester, N. Y.
New-York Central & Hudson River	Jas. Butman	Wm. Johnson	Buffalo, N. Y.
New-York Central & Hudson River	Wm. Buchanan	John McKenna	New-York.
New-York Central & Hudson River			East-Albany, N. Y.
New-York Central & Hudson River		Joseph Jones	West-Albany, N. Y.
New-York Central & Hudson River		George Rowe	Niagara Falls, N.Y.
New-York, Boston & Montreal		H. A. Webster	Dutchess Junc., N.Y.
New-York & Oswego Midland	§Wm. H. Griggs	Wm. H. Griggs	Oswego, N. Y.
New-Jersey Division	J. F. Sechler		Wortendyke, N. J.
New-Jersey Division		J. A. Read	Pompton, N. J.
New-York & New-England	Geo. E. Boyden	Elias E. Pratt	Boston, Mass.
New-York, Providence & Boston.	Jas. H. Anderson	Jas H. Anderson	Providence, R. I.
New-York, New-Haven & Hartford	§§H. Kittendorf	James Denver	New-Haven, Ct.
New-York, New-Haven & Hartford	J. O. Chapman	F. Leppens	Hartford, Ct.
New-Jersey Southern	Rufus Blodgett.		Manchester, N. J.
New-Haven & Derby			New-Haven, Ct.
New-Lisbon			Leetonia, Ohio.
New-Orleans & Ohio	John R. Jordan	John R. Jordan	Paducah, Ky.
New-Orleans, Jackson & Gt. Northern	N. Greener	N. Greener	New-Orleans, La.
New-Haven, Hartford & Springfield			Hartford, Ct.
Naugatuck	Henry Hanford	George. W. Gray	Bridgeport, Ct.
North-Carolina	Rufus D. Wade	B. G. Sergeant	Co. Shops, N. C.
North-Louisiana & Texas	C. H. Tull		Monroe, La.
New-Orleans, Mobile & Texas	J. R. White	D. C. Roland	Mobile, Ala.
Northern Central	C. M. Lewis		Baltimore, Md.
Northern Central		G. W. Demarest	York, Pa.
North-Lebanon		Henry B. Oves	Lebanon, Pa.
North-Pennsylvania	Franklin Roop	Franklin Roop	Philadelphia, Pa.
North-Eastern	D. W. Haines	A. M. Corrie	Florence, S. C.
Northern	James W. Lander	Albert Langmaid	Concord, N. H.
Northern of New-Jersey	T. W. Demorest		New-York.
Norwich & Worcester	Richard Colburn	G. R. Bentley	Norwich, Ct.
Northern of Canada	P. Clark.	P. Clark	Toronto, Can.
Northern Pacific	H. A. Towne		St. Paul, Minn.
Minnesota Division	R. B. Small	W. S. Heathcote	Brainerd, Minn.
Lake Superior & Miss. Division	W. McFarland		St. Paul, Minn.
Dakota Division	C. W. Rossiter		Fargo, D. T.
Pacific Division	J. F. Curtis		Kalama, W. T.
O			
Old Colony & Newport	J. K. Taylor	A. Gleason	Boston, Mass.
Oil City & Pithole	George Thompson		Pithole, Pa.
Oil Creek & Alleghany River	J. S. McElroy	Jacob Williams	Corry, Pa.
Oil Creek & Alleghany	H.J.Bookhammer	John Monks	Oil City, Pa.
Ohio & Mississippi		G.Hibbard	Cochran, Ind.
East Division	A. Thompson		Cochran, Ind.
West Division	H. Elliott	Chas. Hyatt	East St. Louis, Ill.
Oregon & California	§§J. Brandt.		Portland, Oregon.
Owensburg & Russellville	J. R. Osborne		Owensburg, Ky.
P			
Paducah & Memphis	J. D. Linning		Paducah, Ky.
Painesville & Youngstown	G. R. Crane		Painesville, Ohio.
Paris & Decatur	John G. Clifford	G. Clifford	Paris, Ill.
Panama	Chas. E. Stewart	J. G. Wilson	Aspinwall, N. G.
Pacific of Missouri	§§John Hewitt	John Hewitt	St. Louis, Mo.
Pennsylvania	§§F. Thomson		Altoona, Pa.
Pennsylvania	H. D. Garrett	I. W. Van Houten	W. Philadelphia, Pa.
Pennsylvania	E. L Caum	Samuel W. Myers	Harrisburg, Pa.
Pennsylvania	G. W. Strattan	John P. Levan	Altoona, Pa.
Pennsylvania	D. O. Shaver	R. S. Ramsey	Pittsburg, Pa.
New-Jersey Division	John Headden	David H. Baker	Jersey City, N. J.
West-Penn. Division	C. B. Street	James F. Elder	Blairsville, Pa.
Philadelphia and Erie	Martin Walls		Sunbury, Pa.
	W. L. Forster		Renovo, Pa.
	W. L. Holman		Kane, Pa.
	W. T. Smith		Erie, Pa.
	§§T. N. Ely		Erie, Pa.

Railroad.	*Master-Mechanic.*	*Master-Car-Builder.*	*Residence.*
Philadelphia, Wilmington & Baltimore	S. A. Hodgman	Wm. T. Worth	Wilmington, Del.
Philadelphia & Reading	L. B. Paxson	Aaron Steinbach	Reading, Pa.
Germantown & Norris'n Div.	Jackson Richards		Philadelphia, Pa.
Philadelphia & Baltimore Central	S. D. Danfield	Samuel D. Danfield	Chester, Pa.
Pittsburgh, Cincinnati & St. Louis			
Pittsburgh & Columbus Division	E. Pierce		Dennison, Ohio.
Pittsburgh & Columbus Division		James McGee	Steubenville, Ohio.
Little Miami Division		M. P. Ford	Columbus, Ohio.
Little Miami Division	J. H. Setchel		Pendleton, Ohio.
Col., Cin. & Ind. Division	Robert Curtis	Tho. Chamberlain	Columbus, Ohio.
Col., Cin. & Ind. Division	Geo. H. Prescott	Geo. H. Prescott	Logansport, Ind.
Peoria & Rock Island	Geo. Gregg		Peoria. Ill.
Pittsburg, Fort Wayne & Chicago	S. M. Cummings	John Marquis	Allegheny, Pa.
Pittsburg, Fort Wayne & Chicago	J. M. Boon.	Israel Lee	Fort Wayne, Ind.
Pittsburg, Fort Wayne & Chicago		J. J. Kirkland	Crestline, Ohio.
Pittsburg, Washington & Baltimore	A. S. Kinzie		Connellsville, Pa.
Peoria, Pekin & Jacksonville	R. F. Hurd	Jas. J. Doyl	Pekin, Ill.
Peninsular	T. G. Templeton		Battle Creek, Mich
Portland & Rochester	John G. Brady	John G. Brady	Portland, Me.
Portland & Kennebec	John Ellis	C. H. Kenison	Augusta, Me.
Portland & Oxford Central	Geo. W. Battles	Geo. W. Battles	Buckfield, Me.
Portland, Saco & Portsmouth	John Donnell		Portland. Me.
Port Royal	C. W. Furber	E. Hubard	Port Royal, S. C.
Port Hope, Lindsay & Beaverton	H. G. Taylor	H. G. Taylor	Port Hope, Can.
Port Huron & Lake Michigan	R. C. Stewart	R. C. Stewart	Port Huron, Mich.
Providence, Warren & Bristol	Rufus Smith	J. Brightman	Bristol, R. I.
Portsmouth, Gt. Falls & Monmouth	James Tucker	E. Fall	Union Village, N. H.
Petersburg & Weldon	R. B. Andrews	Alex. Wright	Petersburg, Va.
Providence & Worcester	Joseph Kelly	Olney L. Smith	Providence, R. I.
Poughkeepsie & Eastern	John L. Driscoll	Jerry Wigg	Poughkeepsie, N. Y.
Q			
Quincy, Missouri & Pacific	Geo. Adams		Quincy, Ill.
R			
Raleigh & Gaston	J. B. Gayle	J. B. Gayle	Raleigh, N. C.
Richmond, Fredericksburg & Potomac	H. Kuhn	W. H. Trainham	Richmond, Va.
Richmond, Danville & Piedmont	John McFarland	H, Longest	Richmond, Va.
Richmond & Petersburg	John O'Brien	H. L. Carter	Richmond, Va.
Richmond & York River.	C. H. Harris	J. L. Thompson	Richmond, Va.
Rive De Loup	P. A. Logan		Fredericton, N. B.
Rome, Watertown & Ogdensburg	Wm. Jackson	H. H. Sessions	Rome. N. Y.
Reading & Columbia	B. Van Lew		Columbia, Pa.
Rome, Georgia	O. W. Harbin	O. W. Harbin	Rome. Ga.
Rochester & Genesee Valley.	M. E. Brown.	M. Wilder	Buffalo. N. Y.
Rockford, Rock Island & St. Louis	Joseph Elder	T. F. Nolte	Beardstown, Ill.
S			
Saginaw Valley & St. Louis	W. S. Thompson		Saginaw, Mich.
Southern Pacific of California	J. P. Wilson	F. N. Bellisle	San Francisco, Cal.
St. Croix & Lake Superior			New-York City.
St. Croix & Penobscot	Edward Bolton	A G. Page	Milltown, Me.
St. Lawrence & Ottawa	Calvin Dame	Calvin Dame	Prescott, Canada.
St. Louis & Iron Mountain	O. A. Haynes	Oscar Doolittle	Carondelet, Mo.
St. Joseph & Denver City	E. Sleppy		St. Joseph, Mo.
San Antonio & Mexican Gulf.	W. T. Bingham		Victoria, Texas.
South Side of Long Island	Geo. H. Griggs	M. Heitzman	Williamsburg, L. I.
St. Paul & Pacific	J. C. Monroe	T. W. Heathcote	St. Paul, Minn.
St. Paul & Sioux City	F. C. Butterfield	J. W. Lydic	Shakopee, Minn.
St. Louis, Vandalia, T. Haute & Ind.	C. R. Peddle	H. Kirmse	Terre Haute, Ind.
Indianapolis Division	Wm. Riley		Terre Haute, Ind.
Vandalia Division	A. J. Sanborn.		Effingham, Ind.
South-Carolina	W. B. Smith	John Reed	Charleston, S. C.
Southern Central	Chas. G. Brown	H. Mooney	Auburn, N. Y.
Southern Minnesota	—— Waters		Wells. Minn.
South-Western of Georgia	C. D. Wall.		Columbus, Ga.
South-Western of Georgia	D. M.Gogul	James A. Knight	Macon. Ga.
South Shore	Warren E. Ray		Cohasset, Mass.
Stanstead, Shefford & Chambly	W. H. Smith		Waterloo, C. E.
Seaboard & Roanoke	§E. G. Ghio	J. B. Pendleton	Portsmouth, Va.
Stonington & Providence	J. H. Anderson	J. H. Anderson	Providence, R. I.
Selma & Gulf	Wm. T. Daughtrey		Selma. Ala.
Selma, Rome & Dalton	A. G. Maynes	W W. Peirce	Selma. Ala.
Sioux City & Pacific	C. H. Foster		Missouri Val., Iowa.
Spartanburg & Union	J. N. Benner	Jacob Rice	Union C. H., S. C.
Sheboygan & Fond du Lac	A. F. Wallace.	A. F. Wallace	Sheboygan, Wis.
Sullivan & Erie			Tonawanda, Pa.
Syracuse, Binghamton & New-York	H. H. Dawson	David Burling	Syracuse, N. Y.
Syracuse Northern	W. Garrison	L. W. Smith	Syracuse, N. Y.
Sycamore & Cortland			Sycamore, Ill.
St. Louis, Alton & Terre Haute.	**Beriah Warren		St. Louis, Mo.
St. Louis & South-Eastern	L. B. Salisbury		Mt. Vernon, Ill.
Nashville Division	H. M. Smith	W. H. H. Price	Nashville, Tenn.
St. Louis, Kansas City & Northern	H. S. Smith	C. S. Buck	Moberly, Mo.
T			
Taunton Branch.	W. M. Parks	J. G. Codding	Taunton. Mass.
Tioga	Peres Bonny	D. H. Stratton	Blossburg, Pa
Texas & New-Orleans	R. B. Baer		Houston, Texas.
Tennessee & Pacific.	William McKeand	William McKeand	Nashville, Tenn.
Toledo, Wabash & Western	W. F. Ray	**G. W. Cushing	Fort Wayne, Ind
Toledo, Wabash & Western		David Hoit	Toledo. Ohio.
Toledo, Wabash & Western	T. G. Gorman		Springfield, Ill.
Toledo, Peoria & Warsaw	W. O. Hewitt	R. M. Hemphill	Peoria, Ill.
Troy & Boston	Foster Church	R. V. Coon	Troy, N. Y.
Toronto, Grey & Bruce.		Wm. Bowstead	Toronto, Can.
Toronto & Nipissing	J. Haggus		Toronto, Canada.
U			
Union Pacific	§I. H. Congdon	Geo. E. Stevens	Omaha, Nebraska
Utah Central	Thos. Pierpont	Edward Cox	Salt Lake City.
Utica & Black River	Wm. E. Granger	David James	Utica, N. Y.
Utica, Chenango & Susquehanna	C. H. Brown		Utica, N. Y.
V			
Vicksburg & Brunswick	James Boon	J. A. Knight	Eufaula, Ala.
Vicksburg & Meridian	Jas. B. Browne		Vicksburg, Miss.
Vineland			Vineland, N. J.
Vermont Central	J. M. Foss	J. M. Foss	St. Albans, Vt.
Rutland Division	N. L. Davis		Rutland, Vt.
New-London Northern Division	J. W. Dow	S. W. Caulkins	New-London, Ct.
Ogdensburg & L. Champlain Div.	William A. Short	J. R. Ames	Malone, N. Y.
Vermont & Massachusetts	D. T. Davis	Jacob Marsh	Fitchburg, Mass.
W			
Wash. City, Va. Midland & Gr. Southern			Alexandria, Va.
Western Union	John Taylor	E. A. Eddy	Racine, Wis.
Wicomico & Pocomoke			Berlin, Md.
Wilmington, Columbia & Augusta	George Hall	W. J. Calais	Wilmington, N. C.
Westchester & Philadelphia	John Moyer	N. Pawling	Philadelphia, Pa.
Wilmington & Weldon	John Bissit	John Bissit	Wilmington, N. C.
Wilmington & Western			Wilmington, Del.
Wilmington & Reading	Jas. F. Van Horn		Coatesville, Pa.
West-Jersey	W. McAllister	C. C. Williams	Camden, N. J.
Western Maryland	Wm. Cannan	J. H. Nussear	Union Bridge, Md.
Winona & St. Peter	F. C. Ford	H. L. Preston	Winona, Minn.
Western North-Carolina.	J. D. Hollister		Salisbury, N. C.
Western R. R. N. C	M. W. Atkinson	M. W. Atkinson	Fayetteville, N. C.
West-Feliciana	R. C. Brower	Wm. Grawling	Woodville, Miss.
Western & Atlantic	John H. Flynn	Wm. Grambling	Atlanta, Ga.
West-Wisconsin	L. T. Mead	J. C. Fischer	Hudson, Wis.
Worcester & Nashua	Albert Griggs.	Albert Griggs	Worcester, Mass.
Welland	James Taylor	James Chase	St. Catharine, C. W.
Washington & Ohio	Edward Dunn	Joshua Harrison	Alexandria, Va.
White Water Valley	A. W. Britton		Harrison, O.

DIRECTORY

OF

Railway Superintendents and Purchasing Agents

THROUGHOUT THE UNITED STATES AND CANADA.

REFERENCES.—* General Manager. † Managing Director.

A

Railroad.	*Superintendent.*	*Purchasing Agent.*	*Residence.*
Arkansas Central	James E. Gregg		Helena, Ark.
Alabama Central	John M. Bridges		Montgomery, Ala.
Albany & Susquehanna	*C. F. Young	D. W. C. Ramsey.	Albany, N. Y.
Alexandria & Fredericksburg	E. L. Dubarry		Washington, D. C.
Atchison, Topeka & Santa Fe	G. H. Nettleton	G. H. Nettleton	Topeka, Kansas.
Atchison & Nebraska	C. C. Smith	C. C. Smith	Atchison, Kansas.
Alabama & Chattanooga	Chas. L. Fitch	J. C. Stanton, Jr.	Chattanooga, Tenn.
Ashtabula, Youngstown & Pittsburg	J. D. Layng		Pittsburg, Pa.
Atlanta & Richmond Air Line	R. Y. Sage		Atlanta, Ga.
Atlanta & West-Point	L. P. Grant		Atlanta, Ga.
Atlantic & Gulf	H. S. Haines		Savannah, Ga.
Atlantic & North-Carolina	E. G. Stanley		New-Berne, N. C.
Atlantic & Great Western		R. B. Browne	Meadville, Pa.
First and Second Division	A. L. Dunbar	"	"
Third and Fourth Division	T. A. Phillips		Galion, Ohio.
Mahoning Division	J. M. Ferris		Cleveland, Ohio.
Atlantic & Pacific	A. A. Talmage	W. H. Patriarche.	St. Louis, Mo.
Atlantic, Mississippi & Ohio	Henry Fink		Lynchburg, Va.
Atlantic, Tennessee & Ohio	J. J. Gormly		Charlotte, N. C.
Allegheny Valley	J. J. Lawrence	J. J. Lawrence	Pittsburg, Pa.
Adirondack	C. H. Ballard		Saratoga, N. Y.

B

Baltimore & Ohio	Thos. L. Sharp	Benj. Williams	Baltimore, Md.
Central Ohio & Lake Erie Div	W. C. Quincy		Columbus, Ohio.
Baltimore & Potomac	J N. Dubarry		Baltimore, Md.
Bangor & Piscataquis	M. H. Angel	L. H. Eaton	Bangor, Maine.
Boston & Albany	C. O. Russell		Springfield, Mass.
Boston & Providence	A. A. Folsom	A. A. Folsom	Boston, Mass.
Boston, Clinton & Fitchburg	H. A. Blood		Fitchburg, Mass.
Boston, Concord & Montreal	J. A Dodge	Lyon & Vose	Boston, Mass.
Boston & Maine	William Merritt	M. E. Wood	Boston, Mass.
Boston, Lowell & Nashua	J. B. Winslow		Boston, Mass.
Blossburg, Corning & Tioga	A. H. Gorton	R. J. Burnham	Watkins, N. Y.
Brockville & Ottawa	H. Abbott		Brockville, Canada.
Burlington & Missouri River (in Neb.)	C. F. Morse	C. F. Morse	Plattsmouth, Neb.
Burlington, Cedar Rapids & Minnesota	William Greene	S. L. Dows	Cedar Rapids, Ia.
Burlington & South-Western	R. T. Hosford		Burlington, Iowa.
Buffalo & Jamestown	P. C. Doyle		Buffalo, N. Y.
Buffalo, New-York & Philadelphia	J. D. Yeomans		Buffalo, N. Y.
Buffalo, Corry & Pittsburg	H. H. Potter	N. M. Whitside	Corry, Pa.

C

Cairo & Fulton	Thos. Allen		St. Louis, Mo.
Cairo & Vincennes	John Lee, Jr		Cairo, Ill.
Camden & Atlantic	E. Collings		Camden, N. J.
Carolina Central	S. L. Fremont		Wilmington, N. C.
Catasauqua & Fogelsville	C. W. Chapman	C. W. Chapman	Catasauqua, Pa.
Central Pacific	A. N. Towne	J. R. Watson	Sacramento, Cal.
Central of Georgia	Wm. Rogers	H. Yonge	Savannah, Ga.
Central of Iowa	D. N. Pickering		Marshalltown, Ia.
Central Raiload of New-Jersey	R. E. Ricker	W. S. Holden	Elizabeth, N. J.
Chesapeake & Ohio	A. H. Perry	J. A. Netherland	Richmond, Va.
Middle Division	H. D. Chapin		Staunton, Va.
Charlotte, Columbia & Augusta	James Anderson		Columbia, S. C.
Chicago & North-Western	Marvin Hughitt	R. W. Hamer	Chicago, Ill.
Wisconsin & Mill. Division	Arthur A. Hobert		Chicago, Ill.
Peninsula Division	S. C. Baldwin		Escanaba, Mich.
Madison Division	J. H. Stewart		Madison, Wis.
Kenosha Division	A. A. Hobart		Madison, Wis.
Galena Division	Edward J. Cuyler		Chicago, Ill.
Eastern Iowa Division	John B. Watkins		Clinton, Iowa.
Western Iowa Division	John A. Head		Boone, Iowa.
Chicago & Alton	J. C. McMullen	A. V. Hartwell	Chicago, Ill.
Chicago, Burlington & Quincy	R. Harris	H. J. Higgins	Chicago, Ill.
Eastern and Middle Division	C. H. Chappel		Aurora, Ill.
Galesburg Division	H. Hitchcock		Galesburg, Ill.
Quincy Division	N. D. Munson		Quincy, Ill.
Chicago, Dubuque & Minnesota	C. H. Hudson	F. T. Massey	Dubuque, Iowa.
Chicago & Iowa	C. B. Hinkley		Chicago, Ill.
Chicago & Pacific	R. C. Tate		Chicago, Ill.
Chicago, Rock Island & Pacific	Hugh Riddle.	A. Manvel	Chicago, Ill.
Illinois Division	Allen Manvel		Chicago, Ill.
Iowa Division	A. Kimball		Davenport, Iowa.
Chicago & Michigan Lake Shore	A. H. Morrison.	Wm. R. Morrison	St. Joseph, Mich.
Chicago, Danville & Vincennes	J. E. Young	C. B. Mansfield	Chicago, Ill.
Chicago, Pekin & Southwestern	N. J. T. Dana		Streator, Ill.
Cincinnati, Wabash & Michigan	A. G. Wells		Wabash, Ind.
Cleveland, Columbus, Cincinnati & Ind	E. S. Flint		Cleveland, Ohio.
Indianapolis Division	C. C. Gale	A. G. Wright	Indianapolis, Ind.
Columbus Division	Robert Blee		Cleveland, Ohio.
Cincinnati Division	R. H. Shoemaker		Cincinnati, Ohio.
Cleveland & Pittsburg	*J. N. McCullough		Pittsburg, Pa.
Cleveland, Mt. Vernon & Delaware	G. A. Jones		Akron, Ohio.
Cincinnati & Martinsville	T. C. Burnside		Franklin, Ind.
Cincinnati & Terre Haute	Matt. P. Wood	Matt. P. Wood	Terre Haute, Ind.
Cin., Cumberland Gap & Charleston	W. J. Taylor		Knoxville, Tenn.
Cincinnati, Hamilton & Dayton	Q. Williams	P. Hickey	Cincinnati, Ohio.
Cincinnati & Indianapolis Junction	M. M. Martin		Indianapolis, Ind.
Cincinnati, Lafayette & Chicago	E. H. Waldron	J. W. Haight	Lafayette, Ind.
Cincinnati, Sandusky & Cleveland	G. T. Benedict	J. C. Buxton	Sandusky, Ohio.
Colorado Central	T. E. Sickles		Golden, Col.
Columbus & Hocking Valley	J. W. Doherty	J. W. Doherty	Columbus, Ohio.
Concord & Claremont	George E. Todd		Concord, N. H.
Concord	H.E.Chamberlin.	H. E. Chamberlin.	Concord, N. H.
Connecticut River	John Mulligan	John Mulligan.	Springfield, Mass.
Connecticut & Passumpsic Rivers	Wm. M. Parker		Lyndonville, Vt.
Connecticut Valley	Hiram Fowler		Hartford, Ct.
Connecticut Western	W. H. Yeomans		Hartford, Ct.
Corning & Tioga	L. H Shattuck		Blossburg, Pa.
Cumberland Valley	I. F. Boyd	I. F. Boyd	Chambersburg, Pa.

D

Danbury & Norwalk	John W. Bacon		Danbury, Ct.
Dakota Southern	J. S. Meckling	J. S. Meckling	Sioux City, Iowa.
Davenport & St. Paul	N. H. Wood		Urbana, Ill.
Dayton & Michigan	J. H. Weller		Dayton, Ohio.
Dayton & Union	C. C. Gale		Indianapolis, Ind.
Delaware	H. F. Kenney		Philadelphia, Pa.
Delaware & Hudson	R. Manville		Carbondale, Pa.
Delaware, Lackawanna & Western	W. F. Halstead	G. W. B. Cushing	Scranton, Pa.
Morris & Essex Division	Andrew Reasmer.	G. W. Bleashing.	Hoboken, N. J.
Oswego and Syracuse Division	W. B. Phelps		Oswego, N. Y.
Utica, Chenango & Sus. Division	George F. Thompson		Utica, N. Y.
Denver & Rio Grande	W. W. Borst	W. S. Jackson	Denver, Col.
Des Moines Valley	John Givin	G. E. Kilbourne	Keokuk, Iowa.
Detroit & Bay City	A. H. Reese		Detroit, Mich.
Detroit and Milwaukee	Andrew Watson	John S. Lorimer.	" "
Detroit, Hillsdale & Indiana	W. A. Ernst	W. F. Parker	" "
Detroit, Eel River & Illinois	A. B. Southard		Denver, Ind.
Detroit, Lansing & Lake Michigan	A. H. Reese		Detroit, Mich.
Dorchester & Delaware	D. Stewart Hessey		Cambridge, Md.
Dunkirk, Allegheny Valley & Pittsburg	D. Thayer	C. V. DeForest	New-York City.
Dubuque & South-Western	J. P. Farley		Dubuque, Iowa.

E

East-Tennessee, Virginia & Georgia	Joseph Jaques		Knoxville, Tenn.
Eastern (Mass.)	J. Prescott	C. W. Pratt	Boston, Mass.
Elizabethtown & Paducah	D. Brock	D. Brock	Elizabethtown, Ky.
Erie	H. D V. Pratt	W. W. Tallman	New-York, N.Y.
Eastern & Delaware Division	G. S. Redington		Port Jervis, N. Y.
Susquehanna & Rochester "	C. W. Gardner		Elmira, N. Y.
Western & Buffalo "	R. G. Taylor		Buffalo, N. Y.
European & North-American	M. H. Angel	M. H. Angell	Bangor, Maine.
Erie & Pittsburg	John M. Kimball.	Wm. Mullins	Erie, Pa.
Evansville & Crawfordsville	L. Pearson		Evansville, Ind.
Evansville, Terre Haute & Chicago	Jos. Collett, Jr.		Terre Haute, Ind.

F

Fitchburg	Chas.L.Haywood.	John Adams	Boston, Mass.
Flint & Pere Marquette	G. C. Kimball	G. C. Kimball	East-Saginaw, Mich.
Flushing & North-Side			Hunter's Point, L.I.
Fort Wayne, Jackson & Saginaw	W. A. Ernst	Wm. F. Parker	Jackson, Mich.
Fort Wayne, Muncie & Cin	W. W. Worthington		Fort Wayne, Ind.

G

Galveston, Harrisburg & San Antonio	S. E. Bills	J. W. Pierce	Galveston, Texas.
Galveston, Houston & Henderson	John G. Conlon		Galveston, Texas.
Georgia	S. K. Johnson		Augusta, Ga.
Gilman, Clinton & Springfield	S. H. Melvin		Springfield, Ill.
Grand Rapids & Indiana	*C. E. Gorham		Fort Wayne, Ind.
S. Division	J. M. Matheany		Fort Wayne, Ind.
N. Division	H. D. Wallen, Jr		Grand Rapids, Mich.
Grand Rapids & Indiana		William Mullins.	Pittsburg, Pa.
Grand Trunk	C. J. Brydges	John Taylor	Montreal, Canada.
East Division	Henry Bailey		
West Division	W. J. Spicer		
Grand Tower and Carbondale	H. V. Olyphant.	Wm. W. Harris	Grand Tower, Ill.
Great Western (Canada)	William K. Muir.	Robert Beatty	Hamilton, Canada.
Green Bay & Lake Pepin	D. N. Kelly		New-York City.
Greenville & Columbia	Thomas Dodamead		Columbia, S. C.

H

Hannibal & St. Joseph	O. S. Lyford		Hannibal, Mo.
Hartford, Providence & Fishkill	Samuel Nott		Hartford, Ct.
Housatonic	H. W. Franklin		Bridgeport, Ct.
Houston & Texas Central	J. Durand	W. M. Rice, N.Y.	Houston, Texas.
Southern Division	W. H. Vaughan		Houston, Texas.
Northern Division	M. G. Carey		Corsicana, Texas.
Huntingdon & Broad Top	J. McKillips	B. A. Knight	Huntingdon, Pa.

I

Illinois Central	A. Mitchell	O. Ott	Chicago, Ill.
Chicago Division	C. A. Beck		Centralia, Ill.
Northern Division	J. C. Jacobs		Amboy, Ill.
Iowa Division	D. W. Parker		Dubuque, Iowa.
Illinois & St. Louis	W. K. McComas		St. Louis, Mo.
Indianapolis, Bloomington & Western	J. E. Gimperling		Urbana, Ill.
Indianapolis, Cincinnati & Lafayette	George L. Barringer.		Cincinnati, Ohio.
Indianapolis & Vincennes	E. W. McKenna		Indianapolis, Ind.
Indianapolis & Vincennes		Wm. Mullins	Pittsburg, Pa.
Indianapolis & St. Louis	S. Woodward	J. W. Morse	St. Louis, Mo.
Indianapolis, Peru & Chicago	C. B. Robinson	D. Macy.	Indianapolis, Ind.
Michigan City Division	E. C. Murphy		La Porte, Ind.
Intercolonial Railway	Lewis Carvell		Moncton, N. B.
International & Houston & Gt. Northern	H. M. Hoxie		Houston, Texas.
Iowa Midland	J. B. Watkins		Clinton, Iowa.

J

Jacksonville, North-Western & S. E.	E. S. Greenleaf		Jacksonville, Ill.
Jacksonville, Pensacola & Mobile	E. W. Denney		Jacksonville, Fla.
Jefferson, Madison & Indianapolis	Horace Scott	Wm. Mullins	Louisville, Ky.
Junction & Breakwater	John A. Sheaff		Lewis, Del.

K

Kansas Central	A. E. Buchanan		Leavenworth, Kan.
Kansas City, St. Joseph & Council Bluffs	J. F. Barnard		Detroit, Mich.
Kansas Pacific	Edward S. Bowen		Kansas City, Mo.
Kansas Pacific		J. L. Woods	St. Louis, Mo.
Kaw Valley Division	George Noble		Lawrence, Kansas.
Smoky Hill Division	O. H. Dorrance		Ellis, Kansas.
Denver Division	C. W. Fisher		Denver, Col.
Kentucky Central	G. H. Pendleton.	Geo. P. Bowler	Covington, Ky.
Knox & Lincoln	C. A. Combs	Oliver Morse	Bath, Maine.

L

Lackawanna & Bloomsburg	D. T. Bound	G.W. B.Cushing.	Kingston, Pa.
Lake Erie & Louisville	I. H. Burgoon		Fremont, Ohio.
Lake Ontario Shore	E. A. Van Horne		Oswego, N. Y.
Lake Shore & Tuscarawas Valley	W. W. Card		Cleveland, Ohio.
Lake Shore & Michigan Southern	Charles Paine	A. C. Armstrong.	Cleveland, Ohio.
Kalamazoo Division	William Wheaton		Kalamazoo, Mich.
Detroit Division			
Lansing Division			
Leavenworth, Lawrence & Galveston	Chas. B. Peck	E. O. Foote, Jr.	Lawrence, Kan.
Lawrence & South-Western	R. B. Gemmell	R. B. Gemmell	Lawrence, Kan.
Lehigh Valley	Robert H. Sayre		Bethlehem, Pa.
	L. Chamberlin		Philadelphia, Pa.
Beaver Meadow Division	A. G. Brodhead, Jr.		Mauch Chunk, Pa.
Mahony Division	James I. Blakslee		Mauch Chunk, Pa
Wyoming Division	A. Mitchell		Wilkesbarre, Pa.
Little Rock & Fort Smith	S. B. Beaumont.		Little Rock, Ark.
Logansport, Crawfordsville & S. W.	E. C. Dawes		Cincinnati, Ohio.
Long Island	Jno. B. Morford	Oliver Charlick	Hunter's Point, L. I.
Louisville & Nashville & G. Southern	Albert Fink	G. C. Breed	Louisville, Ky.
Clarksville Division	Robert Meek		Clarksville, Tenn.
Memphis Division	J. T. Flynn.		Memphis, Tenn.
Nashville & Decatur Division	D. F. Whitcomb		Nashville, Tenn.
Louisville, Cin. & Lexington	George Skinner	Geo. Skinner	Louisville, Ky.
Louisville, New-Albany & Chicago	M. Sloat	J. R. Parker	New-Albany, Ind.

M

Macon & Brunswick	William McRae	Solomon Hass	Macon, Ga.
Maine Central	L. L. Lincoln	G. A. Phillips	Augusta, Me.
Androscoggin Division	A. Brown.		Lewiston, Me.
Manchester & Lawrence	H. E. Chamberlin		Concord, N. H.
Marietta & Cincinnati	W. W. Peabody		Cincinnati, Ohio.
Marietta & Pittsburg	A. J. Warner	R. B. Hoover	Marietta, Ohio.
Marquette, Houghton & Ontonagon	Samuel Schoch	C. E. Van Cleve	Marquette, Mich.
Maryland & Delaware	J. L. Caldwell	J. L. Caldwell	Easton, Md.
Memphis, Carthage & North-Western	George A. Burt		Carthage, Mo.
Memphis & Little Rock	A. S. Livermore		Memphis, Tenn.
Memphis & Charleston	W. J. Ross	J. B. Galloway	Memphis, Tenn.

Railroad.	*Superintendent.*	*Purchasing Agent.*	*Residence.*
Michigan Central	H. E. Sargent		Chicago, Ill.
Michigan Central		John Newell	Detroit, Mich.
Grand River Valley Division	Charles B. Bush		Grand Rapids, Mich.
Jackson, Lansing & Saginaw Div.	Geo. C. Hopper		Saginaw City, Mich.
South-Haven Division	Geo. E. Curtiss		Kalamazoo, Mich.
Joliet Division	Carlton Wheeler		Joliet, Mich.
South-Bend Division			
Michigan Lake Shore	Chas. E. Gorham		Fort Wayne, Ind.
Michigan Lake Shore	P. S. O'Rourke		Monteith, Mich.
Midland Railway of Canada	H. G. Taylor		Port Hope, Ont.
Midland Pacific	J. N. Converse		Lincoln, Neb.
Milwaukee & Northern	J. W. Crippin		Milwaukee, Wis.
Milwaukee, Lake Shore & Western	W. Elwell		Sheboygan, Wis.
Western Division	J. S. Buck		Appleton, Wis.
Milwaukee & St. Paul	*S S. Merrill	Rob't Wason	Milwaukee, Wis.
Mineral Point	G. W. Cobb		Mineral Point, Wis.
Mississippi Central	R. N. Colquhoun		Water Valley, Miss.
Mississippi Central		A. S. Roberts	New-Orleans, La.
Mississippi & Tennessee	M. Burke	M. Burk	Memphis, Tenn.
Mississippi Valley & Western	E. P. Buell		Quincy, Ill.
Missouri, Iowa & Nebraska	Col. Henry Hill		Warsaw, Ill.
Missouri, Kansas & Texas	W. R. Woodward	G. M. Babcock	Sedalia, Mo.
Cherokee Division	W. H. Adams		Chetopa, Kansas.
Choctaw Division	S. G. Eddy		Holden, Mo.
Eastern Division	Mark M. Towne		Hannibal, Mo.
Sedalia Division	J. J. Frey		Sedalia, Mo.
Neosho Division	L. S. Hamilton		Neosho Falls, Kan.
Missouri Pacific	A. A. Talmage	W. H. Patriarche	St. Louis, Mo.
Missouri River, Fort Scott & Gulf	B. S. Henning	Allen Bowen	Kansas City, Mo.
Mobile & Ohio	L. J. Fleming	C. E. Rushing	Mobile, Ala.
	Cecil Fleming		Mobile, Ala.
	E. S. Hosford		Macon, Miss.
	M. M. Miller		Jackson, Tenn.
Mobile & Girard	W. L. Clark		Columbus, Ga.
Mobile & Montgomery	G. Jordon	G. Jordon	Montgomery, Ala.
Montgomery & Eufaula	B. Dunham	B. Dunham	Montgomery, Ala.
Morgan's Louisiana & Texas		C. A. Whitney & Co.	New-Orleans, La.

N

Nashville, Chattanooga & St. Louis	J. W. Thomas		Nashville, Tenn.
Naugatuck	G. W. Beach		Bridgeport, Ct.
New-Brunswick & Canada	J. P. Crangle	Thomas Williams	St. Stephen, N. B.
New-Bedford & Taunton	Warren Ladd		New-Bedford, Mass.
New-Haven & Northampton	C. N. Yeamans	C. N. Yeamans	New-Haven, Ct.
New-Haven, Middletown & Willimantic	W. A. Waterbury	W. A. Waterbury	Middletown, Ct
New-Jersey Southern	M. W. Serat		Long Branch, N. J.
New-Orleans & Selma	T. H. Du Puy		Selma, Ala.
New-Orleans, Jackson & Great Northern	L. H. Sellars	A. S. Roberts	New-Orleans, La.
New-Orleans, Mobile & Texas	S. N. Scranton		New-Orleans, La.
New-York & Harlem	Chas. M. Bissell	R. C. Moore	New-York, N. Y.
New-York, New-Haven & Hartford	E. M. Reed	R. N. Dowd	New Haven, Ct.
N. Y. & N. H. Division	John T. Moody		New-York, N. Y.
Hartford Division	C. S. Davidson		Hartford, Ct.
Shore Line Division	W. M. Wilcox		New-Haven, Ct.
New-York, Boston & Montreal	C. L. Kimball		Dutchess Jn., N. Y.
New-York Central & Hudson River	J. Tillinghast	C. V. DeForest	Albany, N. Y.
Eastern Division	Zenas C. Priest		Utica, N. Y.
Syracuse & Rochester Division	W. G. Lapham		Syracuse, N. Y.
Buffalo & Rochester Division	M. W. Torrence		Buffalo, N. Y.
New-York & New-England	H. A. G. Pomeroy		Boston, Mass.
Worcester Division	P. St. M. Andrews		Worcester, Mass.
New-York & Oswego Midland	C. W. Douglas	P. Bundy	Jersey City, N. J.
Northern Division	W. P. McKinley		Oswego, N. Y.
New-York, Kingston & Syracuse	H. P. Breed		Rondout, N. Y.
Northern Pacific	*C. W. Mead		St. Paul, Minn.
Minnesota Division	J. H. Sullivan		Brainerd, Minn.
Northern Pacific Division	*J. W. Sprague		Kalama, W. T.
Lake Superior & Miss. Division	W. W. Hungerford		St. Paul, Minn.
North-Louisiana & Texas	J. W. Green		Monroe, La.
North-Pennsylvania	S. W. Roberts	F. A. Cornby	Philadelphia, Pa.
Northern Canada	†F. W. Cumberland		Toronto, Can.
Northern Central	J. S. Redfield		Harrisburg, Pa.
Northern (New-Hampshire)	George E. Todd		Concord, N. H.
North-Eastern (South-Carolina)	S. S. Solomon		Charleston, S. C.

O

Ohio & Mississippi	E. L. Ryder		Cincinnati, Ohio.
Oil Creek & Alleghany River	J. J. Lawrence		Pittsburg, Pa.
Old Colony	J. R. Kendrick		Boston, Mass.
Omaha & North-Western	R. R. Cable		Rock Island, Ill.
Oregon & California	H. Thielson	G. W. Weidler	Portland, Oregon.

P

Paducah & Memphis	J. W. Wilber		Paducah, Ky.
Paris & Danville	B. F. Matthius		Danville, Ill.
Paris & Decatur	F. C. Stratton	P. Campbell	Paris, Ill.
Peninsula	C. F. Miller		Battle Creek, Mich.
Pennsylvania	* A. J. Cassatt	Enoch Lewis	Philadelphia, Pa.
New-York Division	F. W. Jackson		Jersey City, N. J.
Amboy Division	Isaac S. Buckalew		Trenton, N. J.
Belvidere Division	J. A. Anderson		Lambertville, N.J.
Western Pennsylvania Division	Robert Neilson		Blairsville, Pa.
Lewiston Division	Persifer F. Smith		Lewiston, Pa.
Bedford Division	Wm. H. Brower		Bedford, Pa.
Pensacola & Louisville	Daniel H. Cram		Pensacola, Fla.
Peoria & Rock Island	John R. Hilliard		Peoria, Ill.
Peoria, Pekin & Jacksonville	James F. Kelsey		Pekin, Ill.
Petersburg	* Jas. C. Sprigg	D. R. Dunn	Petersburg, Va.
Philadelphia & Reading	J. E. Wootten	W. S. Wilson	Reading, Pa.
Catawissa & Williamsport Br'ch	George Webb		Williamsport, Pa.
Reading & Columbia	B. Van Lew		Columbia, Pa.
Lebanon & Tremont	H. W. Tracy		Pine Grove, Pa.
Philadelphia and Baltimore Central	Henry Wood	Henry Wood	Philadelphia, Pa.
Philadelphia & Erie	W. A. Baldwin	E. Lewis	Erie, Pa.
Western Division	J. W. Reynolds		Erie, Pa.
Middle Division	Edmund L. Tyler		Renovo, Pa.
Eastern Division	Thomas Gucker		Williamsport, Pa.
Philadelphia, Wilmington & Baltimore	H. F. Kenney		Philadelphia, Pa.
Pithole Valley	J. T. Blair		Pithole City, Pa.
Pittsburg, Cincinnati & St. Louis	*J. N. McCullough	Wm. Mullins	Pittsburg, Pa.
Pittsburg & Cin. Division	Hugh Pitcairn		Pittsburg, Pa.
Little Miami Division	J. D. Ellison		Cincinnati, Ohio.
Indianapolis & C. Division	D. W. Caldwell		Columbus, Ohio.
Pittsburg, Washington & Baltimore	E. K. Hindman		Pittsburg, Pa.
Pittsburg, Ft. Wayne & Chicago	*J. N. McCullough	Wm. Mullins	Pittsburg, Pa.
Eastern Division	Richard Wiggin		Pittsburg, Pa.
Western Division	C. D. Gorham		Fort Wayne, Ind.
Port Royal	S. C. Millett		Port Royal, S. C.
Port Huron & Lake Michigan	W. L. Bancroft		Port Huron, Mich.
Portland & Ogdensburg	J. Hamilton	John E. Donnell	Portland, Maine.
Portland & Rochester	W. H. Turner	W. H. Turner	Portland, Maine.
Portland, Saco & Portsmouth	Francis Chase		Portland, Maine.
Portsmouth, Great Falls & Conway	J. W. Sanborn		Portsmouth, N. H.
Portsmouth	H. E. Chamberlin		Concord, N. H.
Poughkeepsie & Eastern	J. A. Perkins	A. W. Cable	Poughkeepsie, N. Y.
Providence & Worcester	W. D. Hilton	W. D. Hilton	Providence, R. I.
Providence, Warren & B	Waterman Stone		Providence, R. I.

Q

Quincy, Alton & Illinois	N. D. Munson		Quincy, Ill.
Quincy, Missouri & Pacific	J. R. Buchanan		Quincy, Ill.

Railroad.	*Superintendent.*	*Purchasing Agent.*	*Residence.*

R

Raleigh & Gaston	A. B. Andrews	A. B. Andrews	Raleigh, N. C.
Rensselaer & Saratoga	H. A. Fonda		Albany, N. Y.
Richmond, York River & Chesapeake	Reuben Foster	Hugh Graham	Richmond, Va.
Richmond & Danville	T. M. R. Talcott		Richmond, Va.
Richmond, Fred. & Potomac	E. T. D. Myers	T. L. Courtney	Richmond, Va.
Richmond & Petersburg	R. L. Stainback		Richmond, Va.
Rockford, Rock Island & St. Louis	R. R. Cable		Rock Island, Ill.
Rome, Watertown & Ogdensburg	J. W. Moak		Watertown, N. Y.

S

St. Lawrence & Ottawa	R. Luttrell		Prescott, Can.
St. Joseph & Denver City	L. D. Tuthill		St. Joseph, Mo.
St. Paul & Pacific	E. Q. Sewell	E. C. Becker	St. Paul, Minn.
St. Paul & Sioux City	J. F. Lincoln		St. Paul, Minn.
St. Louis, Alton & Terre Haute	W. G. Broughton		St. Louis, Mo.
St. Louis & Iron Mountain	Arthur W. Soaper	W. S. Cuddy	St. Louis, Mo.
St. Louis & South-Eastern	*E. F. Winslow	C. W. Gardiner	St. Louis, Mo.
St. Louis Division	George S. Winslow		Mt. Vernon, Ill.
Nashville Division	H. L. Morrill		Henderson, Ky.
St. Louis, Kansas City & Northern	W. C. Van Horne	R. W. Green	St. Louis, Mo.
St Louis Division	J. L. Hinkley		St. Louis, Mo.
St. Louis, Vandalia, Terre Haute & Ind.	John E. Simpson		Indianapolis, Ind.
St. Louis, Vandalia, Terre Haute & Ind.	Chas. R. Peddle		Terre Haute, Ind.
Sacramento Valley & P. & S. V.	F. A. Bishop		Sacramento, Cal.
Saginaw Valley & St. Louis	J. B. Gillett	J. B. Gillett	Saginaw, Mich.
San Francisco & Northern Pacific			
Savannah & Charleston	C. S. Gadsden		Charleston, S. C.
Seaboard & Roanoke	J. B. Pendleton	J. A. Walton	Baltimore, Md.
Selma, Marion & Memphis	J. P. Fresenius		Marion, Ala.
Selma, Rome & Dalton	E. G. Barney		Patona, Ala.
Sheboygan & Fond du Lac	Brandon Mozley	Brandon Mozley	Fond du Lac, Wis.
Shenango & Allegheny	G. H. McKibbin		Greenville, Pa.
Sioux City & Pacific	L. Burnett	L. Burnett	Missouri Valley, Ia
Sodus Point & Southern			Sodus Point, N. Y
South-Shore	J. R. Kendrick		Boston, Mass.
South & North-Alabama	M. Stanton		Birmingham, Ala.
South-Side, Long Island			
South-Carolina		A. Mitchell	Charleston, S. C.
Southern Central	James G. Knapp		Auburn, N. Y.
Southern Minnesota	*H. W. Holley		Wells, Minn.
Southern Pacific of California	A. N. Towne		Sacramento, Cal.
Spartanburg & Union	Thomas P. Jeter		Unionville, S. C.
Springfield & North-Western	*A. J. Ware		Pekin, Ill.
Springfield & Ill. South-Eastern	G. W. Norris		Springfield, Ill.
Staten Island	J. W. Wilbur		New-York, N. Y.
Stonington & Providence	A. S. Mathews	A. S. Mathews	Stonington, Ct.
Sullivan & Erie	R. A. Packer		Towanda, Pa.
Syracuse Northern	C. B. Morse	C. B. Morse	Syracuse, N. Y.
Syracuse, Binghamton & New-York	T. Voorhees	G. W. B. Cushing	Syracuse, N. Y.

T

Tennessee & Pacific	George Maney		Nashville, Tenn.
Texas & New-Orleans	R. B. Baer		Houston, Texas.
Toledo, Peoria & Warsaw	W. H. Cruger	J. A. Winner	Peoria, Ill.
Western Division	David K. Smith		Peoria, Ill.
Western Division	William E. Dorwin		Warsaw, Ill.
Toledo, Wabash & Western	Geo. H. Burrows	J. J. Nessle	Toledo, Ohio.
Eastern Division	C. W. Bradley		Lafayette, Ind.
Western Division	D. A. Collins		Lafayette, Ind.
Ohio Division	H. F. Clark		Toledo, Ohio.
Troy & Boston	C. W. Moseley		Troy, N. Y.
Toronto, Grey & Bruce	N. Weatherston	W. Watson	Toronto, Can.
Toronto & Nipissing	J. C. Bailey		Toronto.
Tuckerton	J. Naramore		Tuckerton, N. J.

U

Union Pacific	T. E. Sickles	T. E. Sickles	Omaha, Neb.
Mountain Division	S. J. Nichols		Cheyenne, Wyom'g.
Laramie Division	S. T. Shankland		Laramie, Wyoming.
Western Division	O. H. Earll		Evanston, Ill.
Utah Central & Southern	John Sharp	S. H. Hill	Salt Lake City.
Utica & Black River	T. W. Spencer		Utica, N. Y.
Utica, Ithaca, & Elmira	H. P. Goodrich		Ithaca, N. Y.

V

Vermont & Mass. & Troy & G	O. T. Ruggles	O. T. Ruggles	Fitchburg, Mass.
Vermont Central	Gyles Merrill		St. Albans, Vt.
Western Division	John Schrier		Ogdensburg, N. Y.
Central & Southern Division	Ambrose Arnold		St. Albans, Vt.
Northern & Eastern Division	G. L. Stone		" " "
Rutland Division	J. Burdett		Rutland, Vt.
New-London Northern	G. T. Benedict		New-London, Ct.
Vicksburg & Brunswick	Virgil Powers	H. Young	Eufaula, Ala.
Vicksburg & Meridian	E. F. Raworth		Vicksburg, Miss.

W

Washington & Ohio	R. H. Havener	Lewis McKenzie	Alexandria, Va.
Welland	William Pay		St. Catherine, Ont.
Wellsboro & Lawrenceville	A. H. Gorton		Corning, N. Y.
Westchester & Philadelphia	Henry K. Smith	J. J. Bryant	Philadelphia, Pa.
West-Wisconsin	J. H. Hull	J. H. Hull	Hudson, Wis.
West Jersey	W. J. Sewell		Camden, N. J.
Western of North-Carolina	John M. Rose		Fayetteville, N. C.
Western & Atlantic	Wm. McRae		Nashville, Tenn.
Western Maryland	John T. Rigney	John T. Rigney	Baltimore, Md.
Western Union	D. A. Olin		Racine, Wis.
White Water Valley	H. M. Britton	H. M. Britton	Cincinnati, Ohio.
Wilmington & Western	M. C. Conwell		Wilmington, Del.
Wilmington, Columbia & Augusta	James Anderson	James Anderson	Wilmington, N. C.
Wilmington & Weldon	J. F. Devine		Atlanta, Ga.
Wilmington & Reading	C. Stoltz	C. Stoltz	Coatesville, Pa.
Winona & St. Peter	J. H. Stewart	J. H. Stewart	Winona, Minn.
Wisconsin Central	C. Harris		Menasha, Wis.
Worcester & Nashua	C. S. Turner	C. S. Turner	Worcester, Mass.

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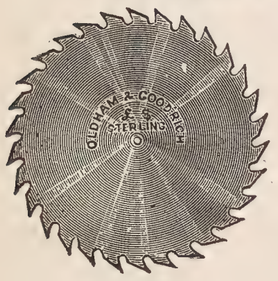

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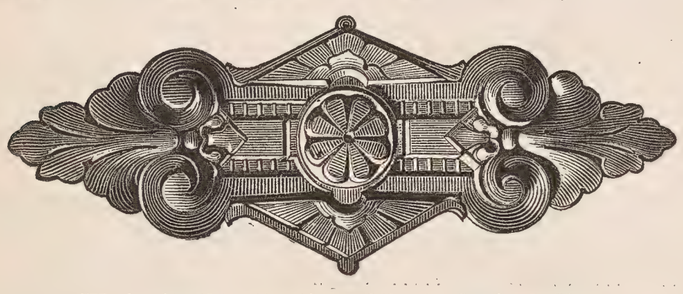

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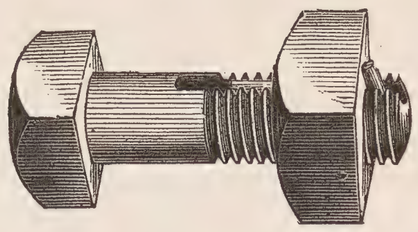
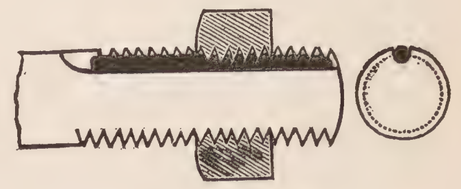


"CUMMING NUT-LOCK,"
Patented
June 16, 1868,
August 23, 1870.



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This simple device, as will be seen by the engravings, consists of a groove being cut in the threaded part of a screw bolt into which is placed a key of copper wire, or other soft metal; when the nut is screwed on, it cuts a thread on the key, thereby making it impossible for the key to get out until the nut is taken off. When the nut is screwed up to its place, that part of the key over which the nut has passed is riveted up against the nut with a small punch, destroying the thread on the key. The nut, therefore, can not move backward until force is used, as with a wrench.

The groove can be rapidly cut with a simple machine designed for the purpose.

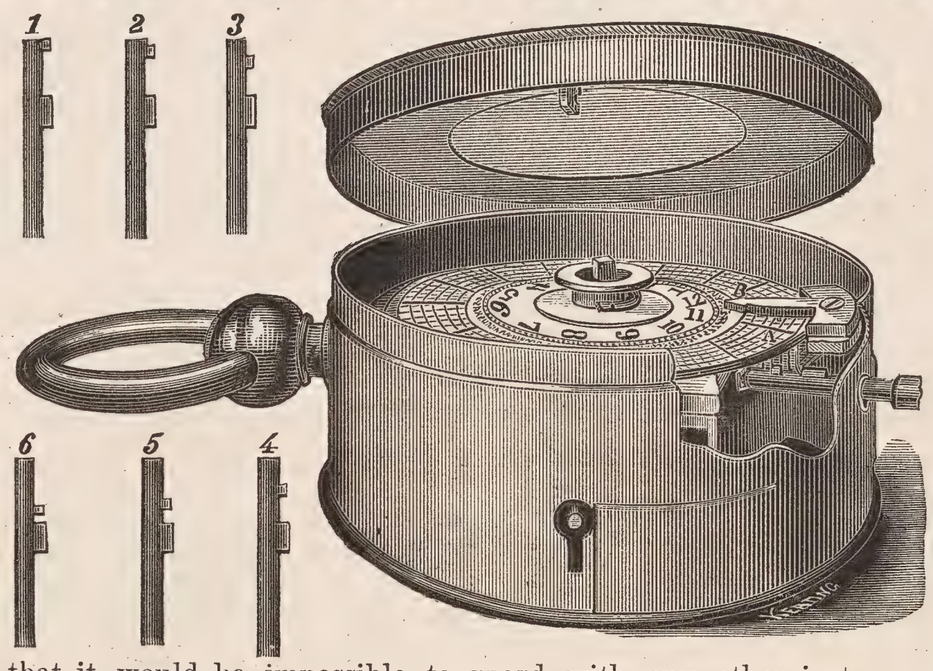
Experience has proved this device absolutely reliable, and it is the cheapest of all known devices for the purpose. By its use, old bolts on which the nuts have become too slack for use can be made as good as new, making it a great saving to railroad companies and others in that item alone. It is cheaper than a check-nut.

If the bolt should become slack from shrinking of timber or other causes, *the nut will always remain firmly attached to the bolt*, and, with the wrench, can be screwed up *any distance*, and the wire riveted up any number of times, or can be taken off without injury to the nut or bolt.

This is the only method in use that locks the nut firmly to the bolt without regard to place or surroundings, all others require some attachment that holds the bolt in its position, and a washer or other attachment to keep the nut from turning.

DIRECTIONS FOR USE.—Place the copper key in the slot, pointed end out, and beveled side up, in such a position that when the nut is screwed to its place about three-eighths of an inch of the key will project beyond its outer face. Then screw the nut to its place *over the key*, allowing it to cut its own thread in the copper. Then take a narrow flat set punch, and rivet the projecting part of the key *solidly* against the outer face of the nut. To tighten the nut: screw it up, and rivet the key tighter. To remove the nut: simply apply the wrench and unscrew the nut. It will cut its own way out through the copper. The same key can be used several times, by moving it outward a few threads in the slot.

BUERK'S WATCHMAN'S TIME DETECTOR,



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It is not so likely to become disarranged in its works as a good watch, because its parts are stronger. But when it needs cleaning, any common watchmaker can adjust it, its mechanism being simple.

It requires no fixtures or wires communicating from room to room, as is the case with the ordinary Watch-Clocks. A small, inexpensive, stationary key is alone required at each station.

Its use is not restricted to a single building, and places can be guarded that it would be impossible to guard with any other instrument, such as Railroad Tunnels, Bridges, Shops, etc.

The instrument will, in all cases, be warranted perfect and satisfactory.

☞ This Detector is covered by two United States Patents. Parties using or selling these instruments, without authority from me, will be dealt with according to law. Address,

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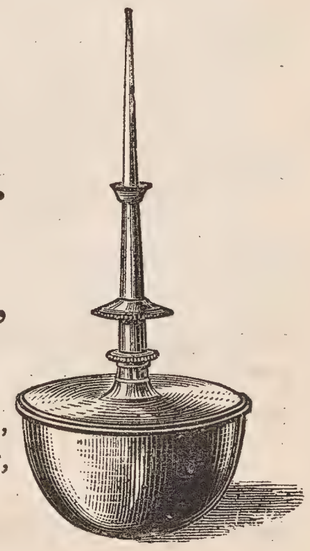
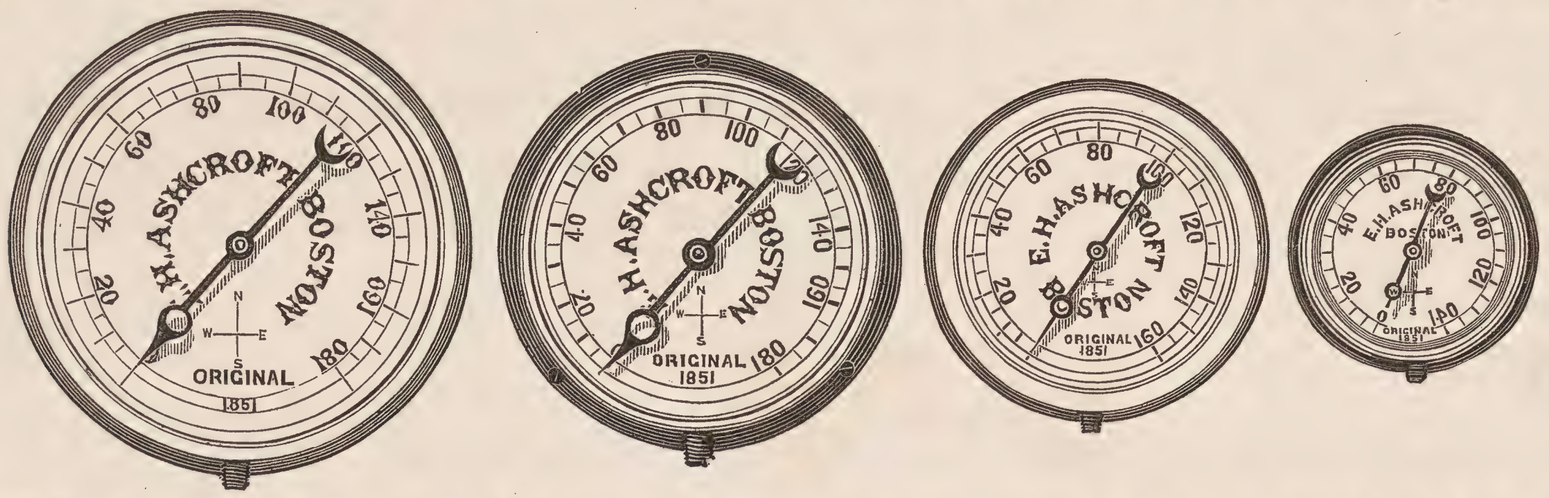


To Railroad Master Mechanics and Locomotive Engine Builders.



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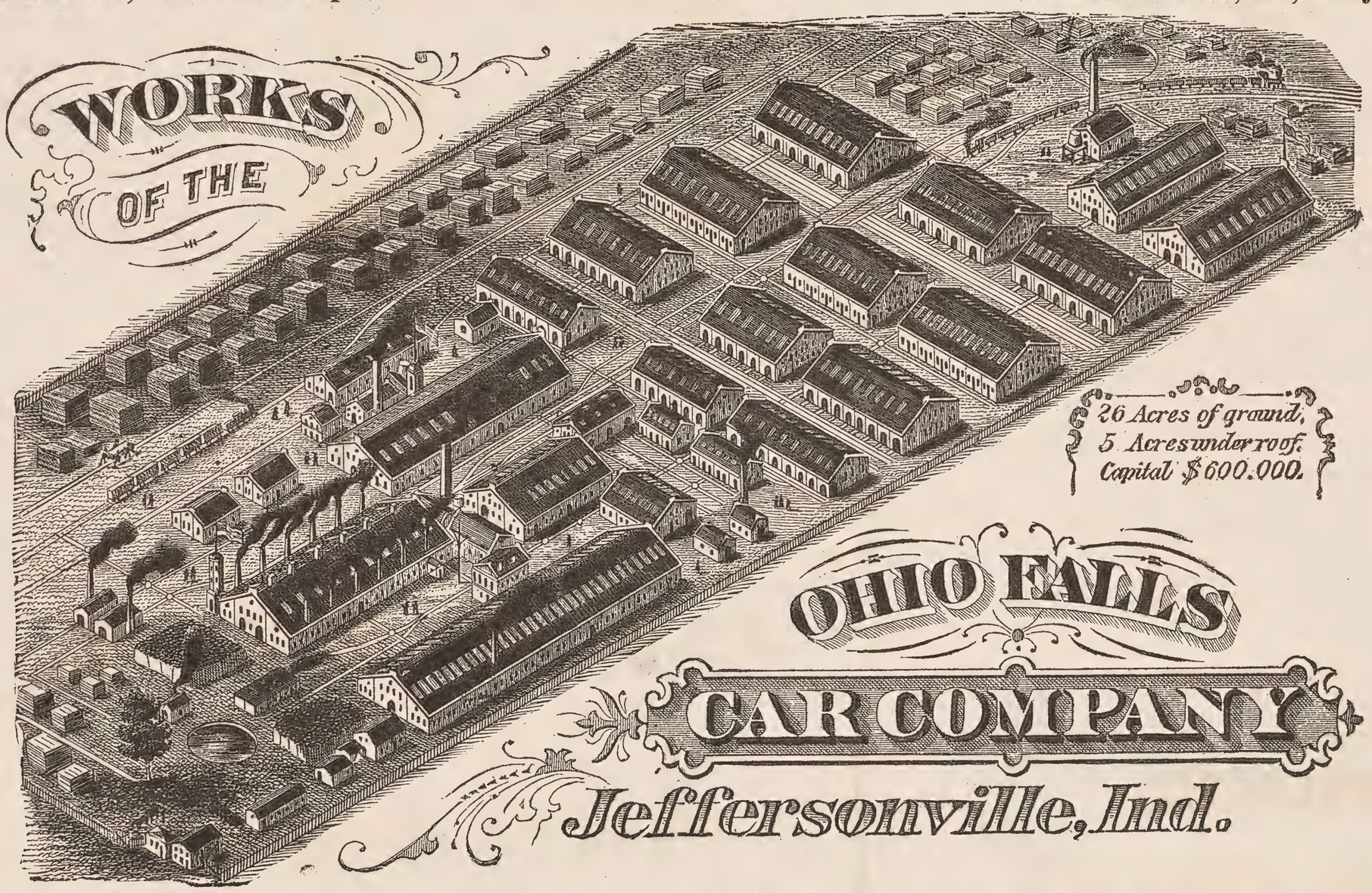

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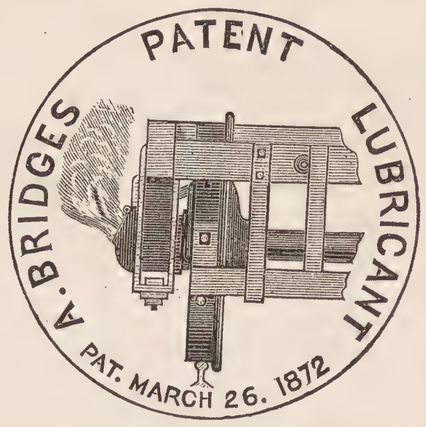

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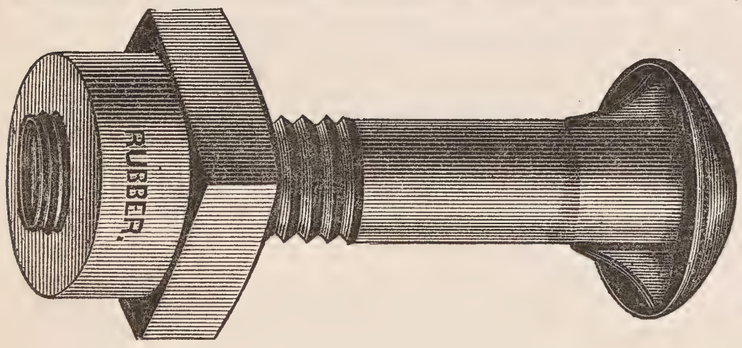

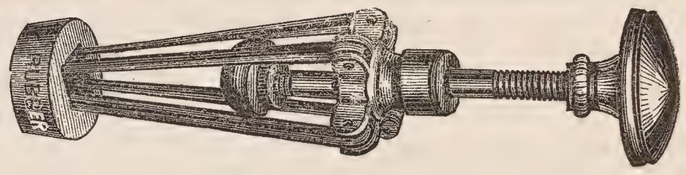

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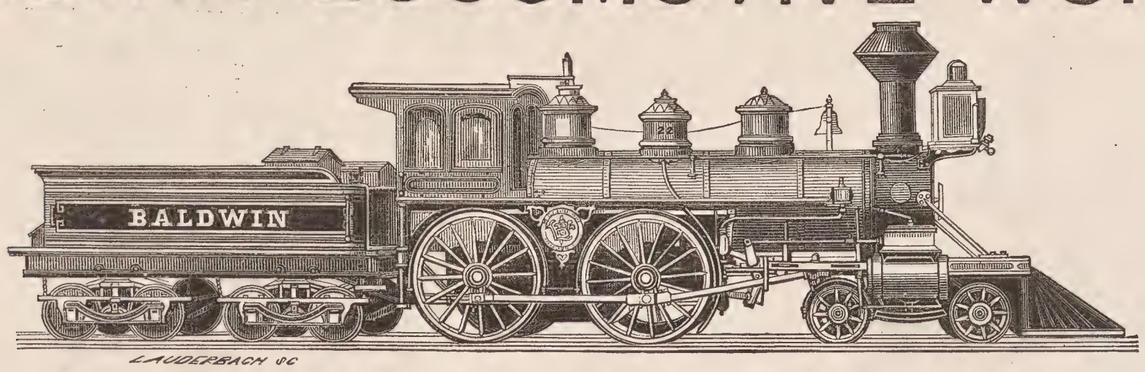

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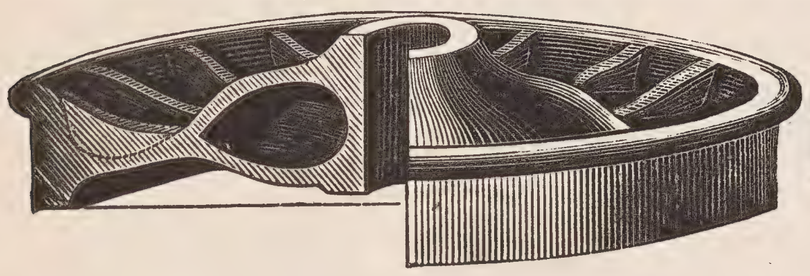

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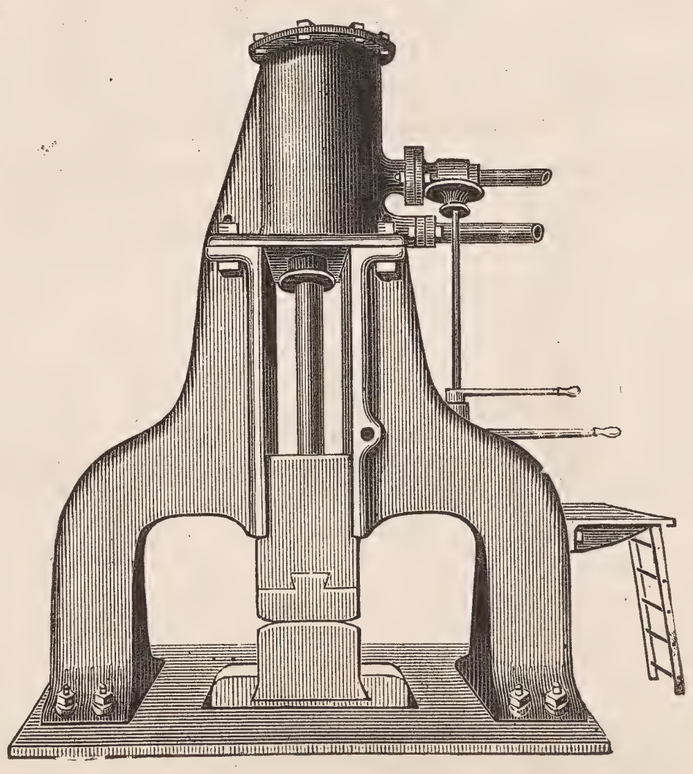

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From the many flattering testimonials received by the Patentee from the parties now using it a few only can be appended.

TESTIMONIALS.

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The article known as TULLY'S PATENT PAINT FILLER has been used for upward of three years by this Company, on Cars, Engines, Cabs, Wheels, Tenders, etc., etc., and find it an excellent substance for preparing fine surfaces, reducing the time usually spent in rubbing down one third. Wearing well, and with a fair trial, it will prove all that is claimed for it where introduced and placed before the public, as the best result of many years' experience obtained by a thoroughly practical Painter.

A. MITCHELL, *Master Mechanic,*
L. & M. Division of L. V. R. R.

We fully concur in the above.

JAMES I. BLAKESLEE, *Sup't of*
L. & M. Division of Lehigh Valley Railroad.
A. G. BROADHEAD, JR., *Sup't*
Beaver Meadow Div. L. V. R. R.
PHILIP HOFECK, *M. M., B M. Div.*
JOHN I. KINSEY, *M. M., L. V. R. R.*
DAVID CLARK, *M. M., Hazleton Div.*

Having full confidence in the men whose signatures are attached hereto, I endorse all they say, and confidently recommend Mr. TULLY'S PATENT PAINT FILLER to all in want of an article of the kind.

ROBERT SAYRE, *Sup't and Eng'r,*
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N. B.—In addition to the *"PATENT PAINT FILLING,"* we manufacture a *Superior Belgian Varnish Filler,* designed to fill the grain of Hard and Fancy Woods used in the construction of Passenger and Sleeping Cars. By its use from *Two to Three* Coats of Varnish are saved. Also, a *Scraping Filler* for Cars, Locomotives, Cabs, etc., to be *used where great dispatch is required.*

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Superior Belgian Varnish Filler,	
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Directions for use accompany each package.

J. W. TULLY, Patentee and Gen. Agent.

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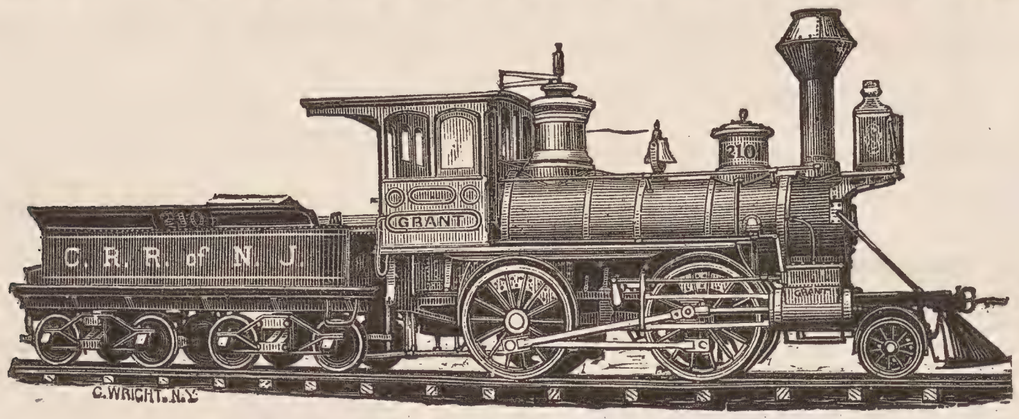

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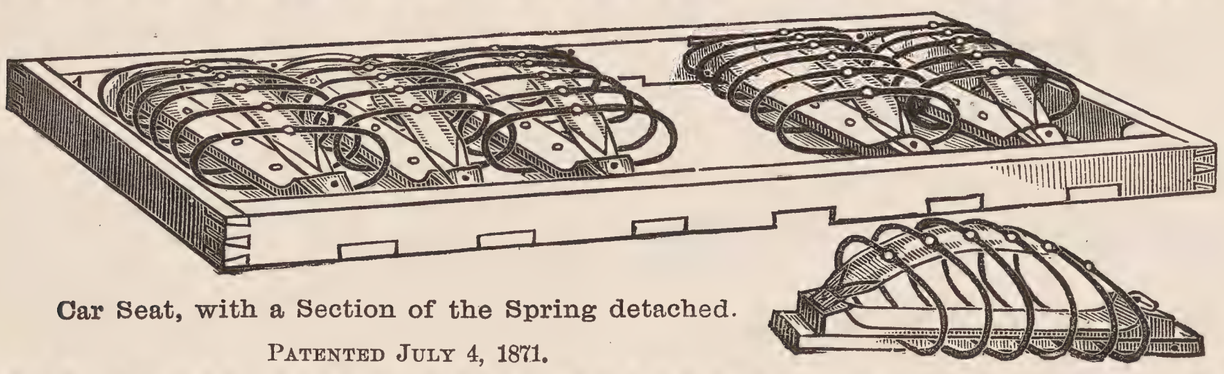

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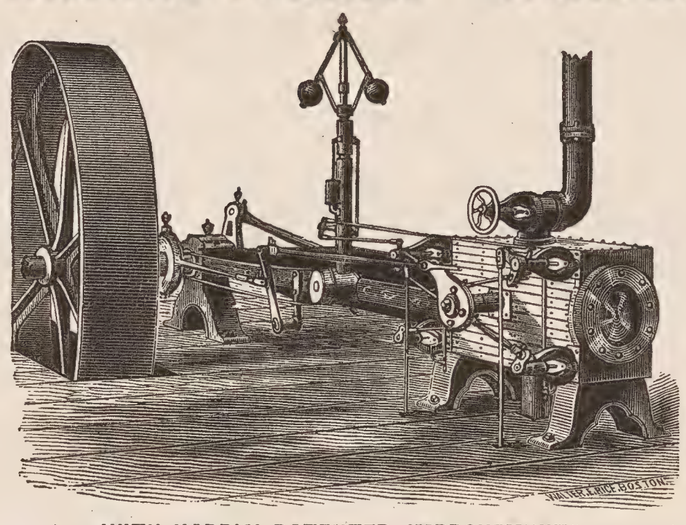

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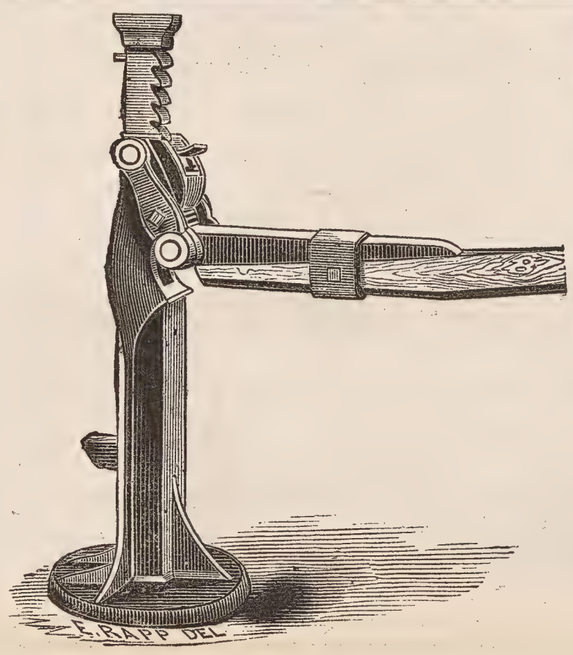

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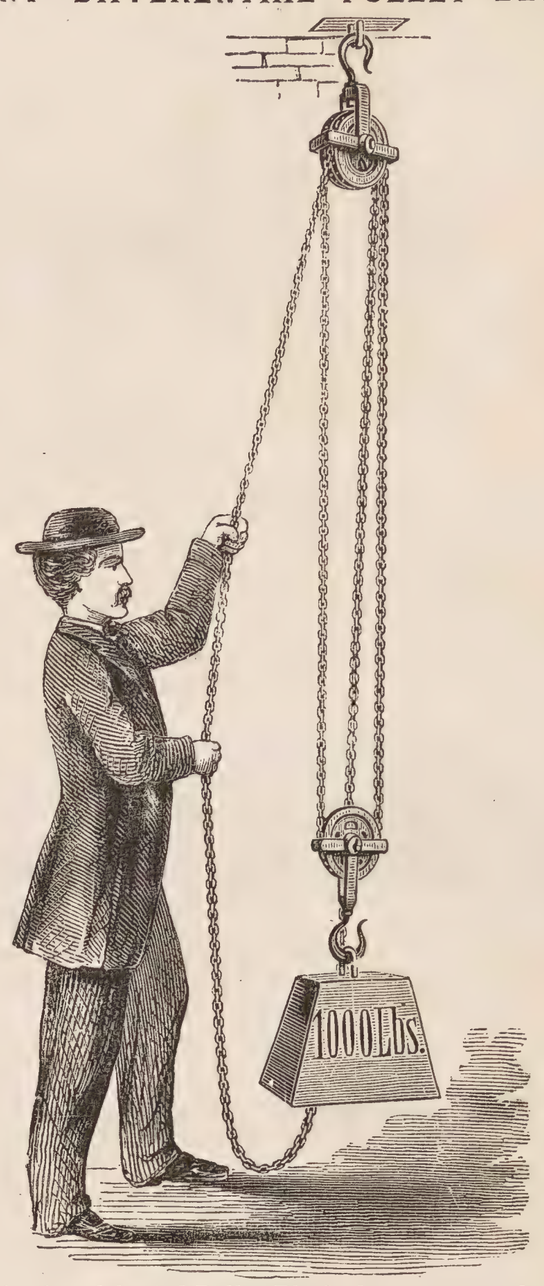

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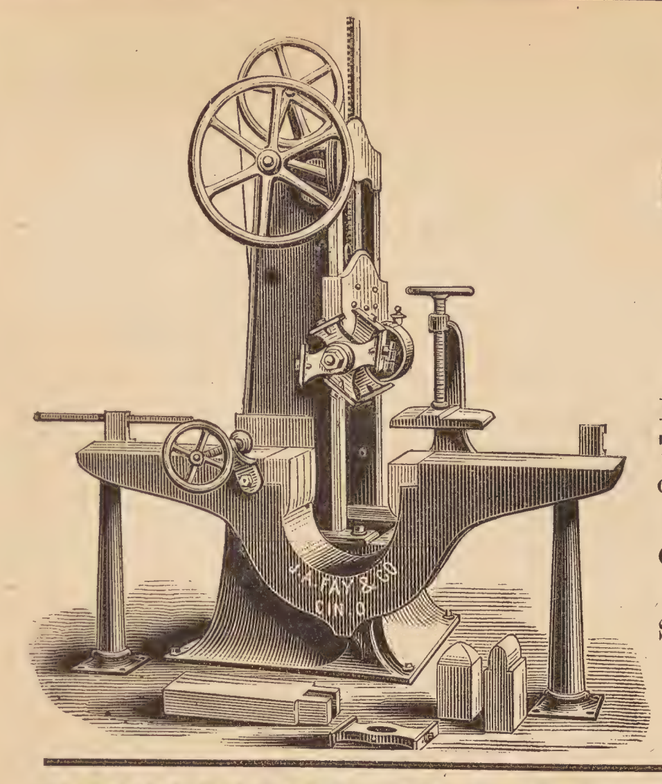

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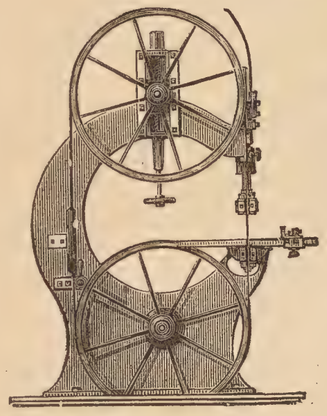

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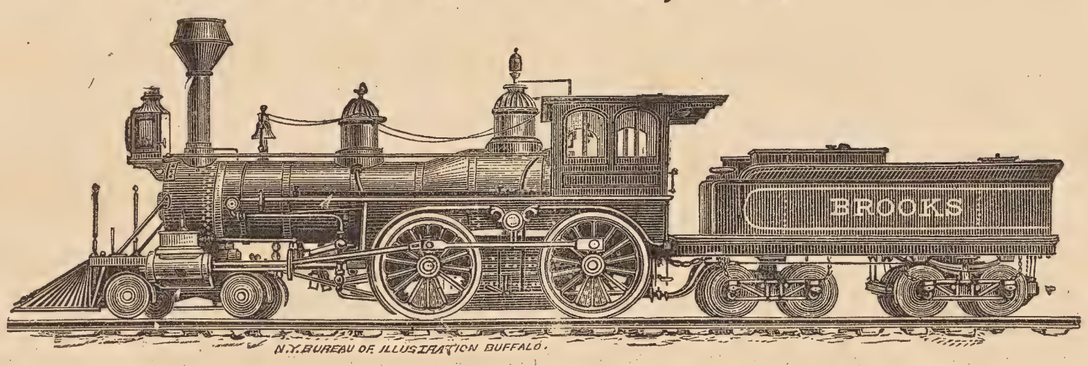

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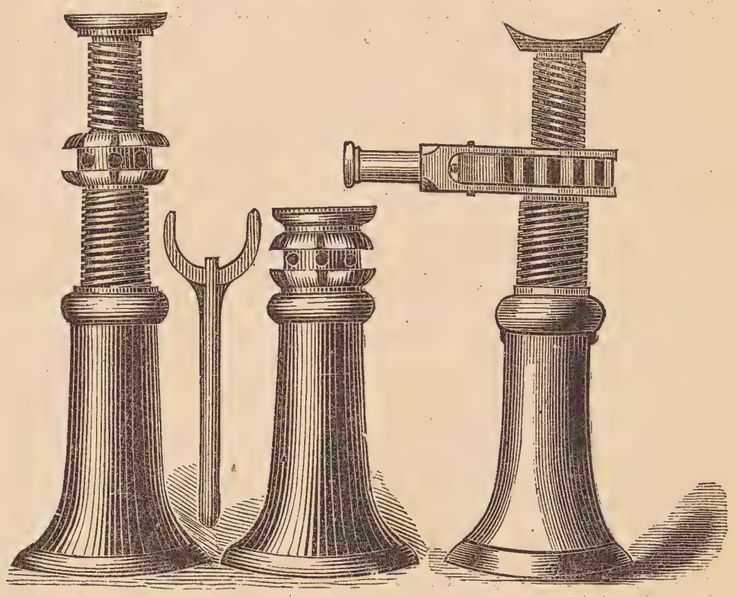

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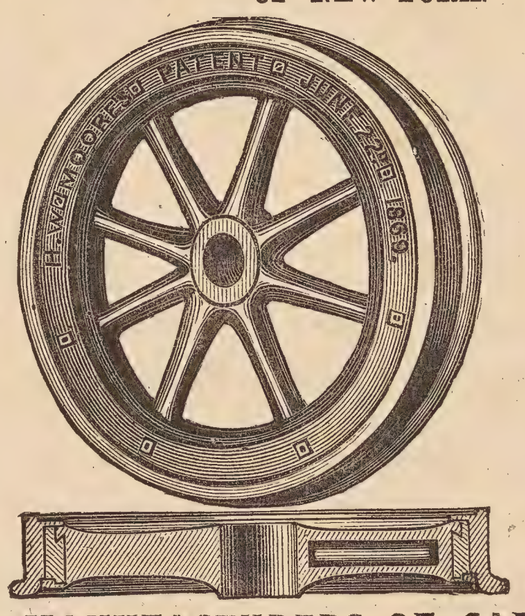

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Bay and Empire State Fancy Wood and Veneer Depots.

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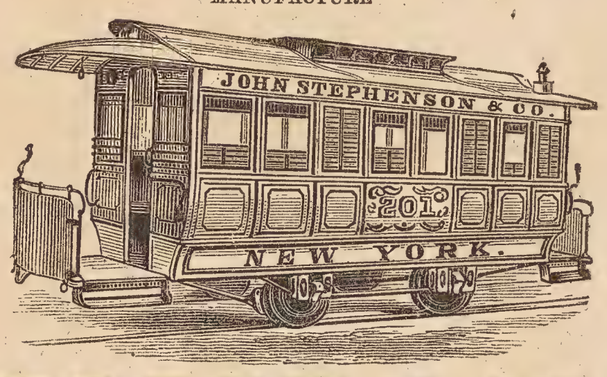

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"I have used, for several years, **BROWNE'S** Patent Metallic Weather Strips and Window Bands on our Drawing-Room and Sleeping-Cars to my **ENTIRE** satisfaction. They do not **CONTRACT** when exposed to the heat of the sun, nor **WARP** or **SPLIT;** and, in fact, they are a **STAPLE** article of practical utility, and I cheerfully recommend them.

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WITH BEST TOOLS ONLY.
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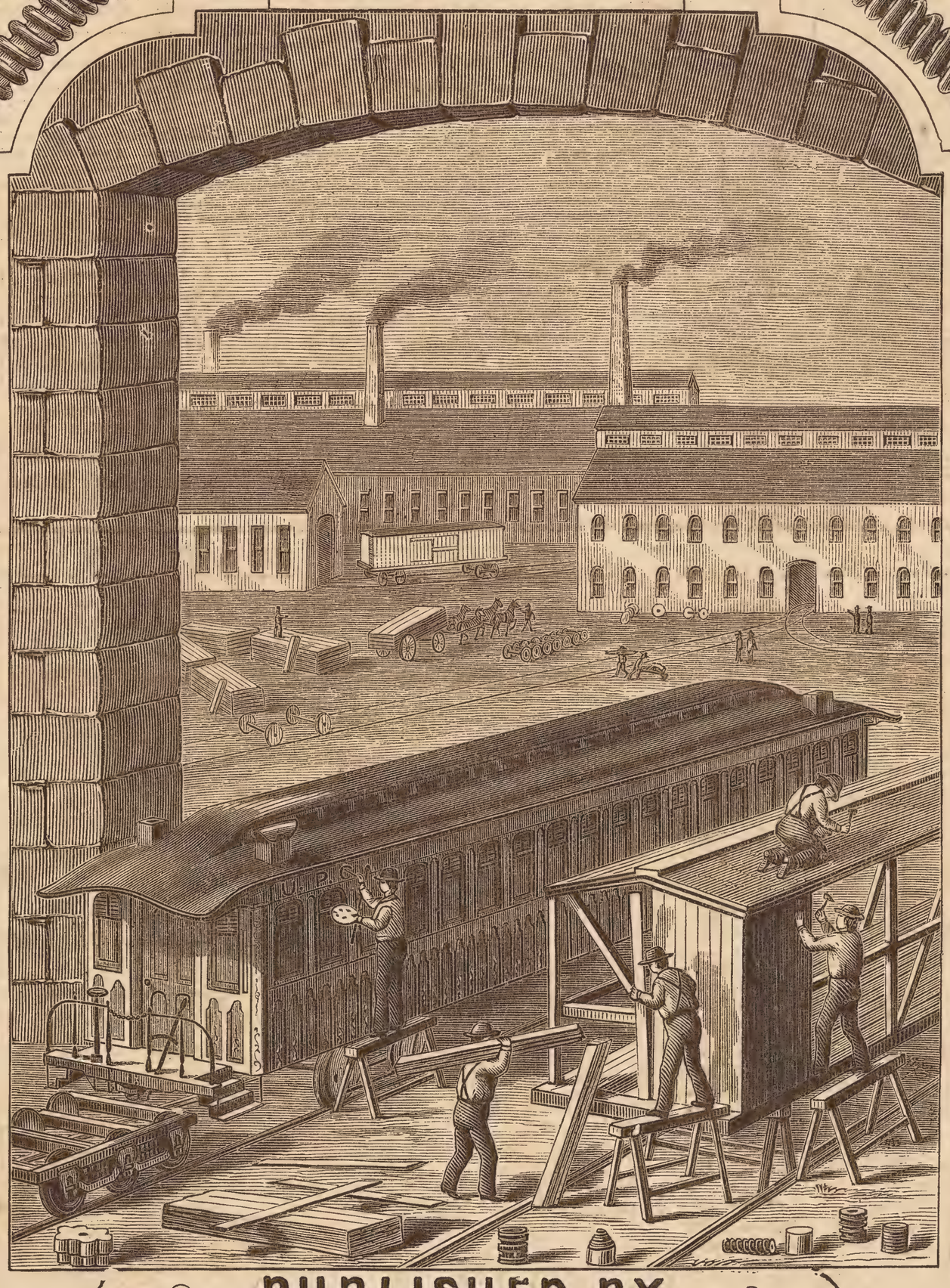
THE NATIONAL CAR BUILDER.

Devoted to the Interests of Railway Rolling Stock.

Vol. IV. OCTOBER, 1873. No. 10.



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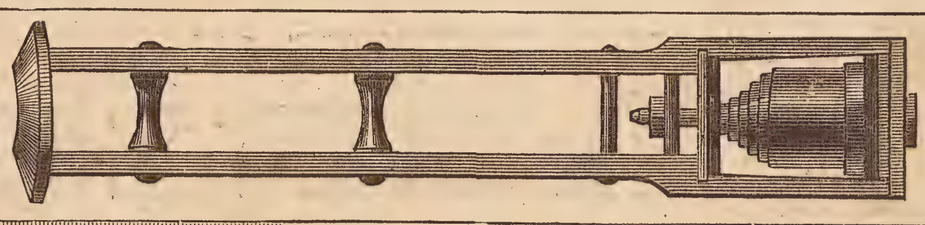

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Canada.

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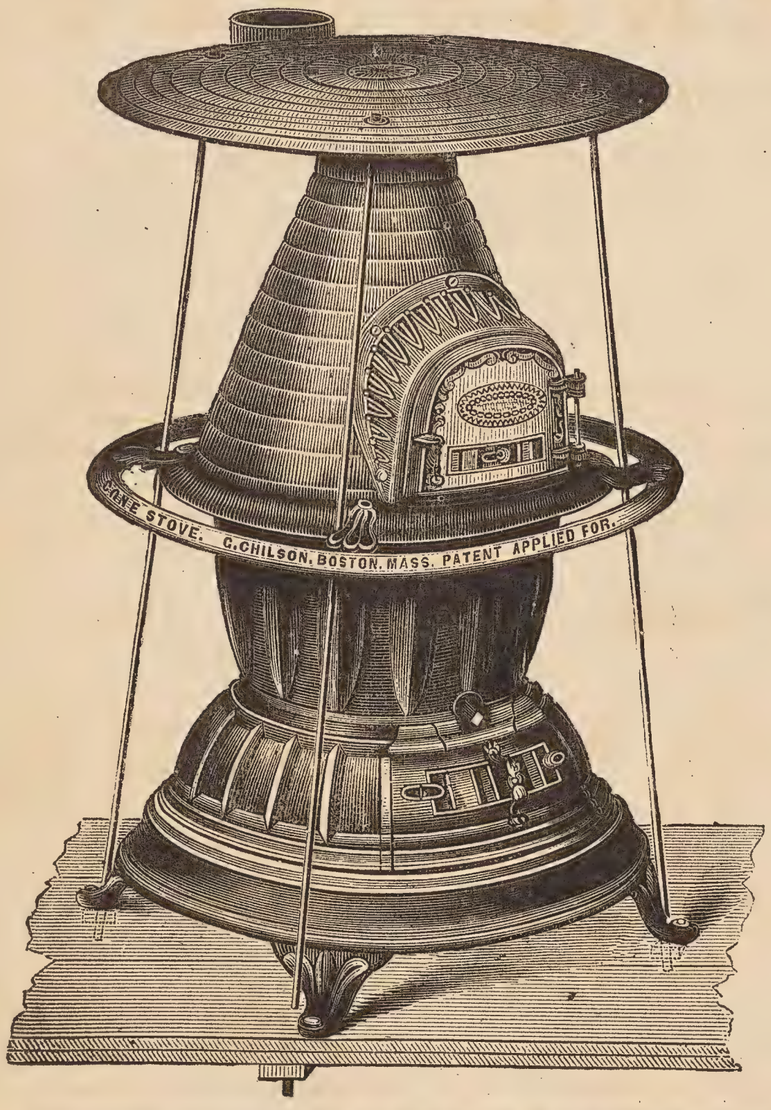
England.

ENTERED, according to Act of Congress, in the year 1873, by VOSE, DINSMORE & Co., in the Office of the Librarian of Congress at Washington.

A NEW RAILWAY CAR STOVE.

Chilson's Patent Cone Disk Stove

ON A NEW AND MODEL PLAN.



I WOULD respectfully call the attention of Railway Managers and others interested in warming Railway Cars, Station Houses, etc., to this Stove, which has been thoroughly tested on several of our railways for a few years past, and has proved in every instance the most successful plan yet devised for thoroughly warming Railway Cars. This Stove is on a new and model plan, differing in principle and operation from all others in the United States. I claim for it *Safety, Economy, Durability, Simplicity, Cleanliness, and Beauty of Design.* Its peculiar merits may be stated as follows:

1. The conical radiator holds the hot smoke and gases back near the fire until they are thoroughly consumed, and the heat is rapidly radiated from the tapering surface of the cone.

2. The broad radiating disk prevents the heat from ascending to the upper part of the car or room, but distributes and throws it down to the floor, thoroughly warming the lower currents of cold air in the car or room for a great distance around the Stove, thus securing the long desired object of making the *lower part of the car and floor comfortably warm, especially for the feet.*

3. It is constructed in the most substantial and durable manner, from a new and beautiful design, wholly of *cast iron*, hence is not subject to the repairs of common stoves.

4. It is perfectly *safe*, being well secured against *accidental fires by being bolted down to the floor and having locks on the doors, so that in case a car should be overturned, fire could not get out of the Stove.* The guard rail which supports the feet when warming them, also serves as a fender, preventing the clothing from coming in contact with the Stove.

5. There is no hearth for dirt, filth, and tobacco spittle to accumulate on, which insures *cleanliness around the Stove.*

6. This Stove keeps the fire for a long time, and although adapted for coal, yet wood can be burned in it equally well.

It will be highly appreciated by all in want of a superior heater for *Factories, Stores, Offices,* RAILROAD CARS, and STATION HOUSES, *School Rooms, Workshops, etc.*, and has especially proved itself to be the most successful plan yet devised for warming RAILROAD CARS.

The BOSTON AND PROVIDENCE RAILROAD COMPANY have over two hundred of these Stoves in use, and the BOSTON AND ALBANY and several other Roads are adopting them, with the most perfect success.

BOSTON AND PROVIDENCE RAILROAD CORPORATION,
Superintendent's Office, Boston, April, 1873.

GARDNER CHILSON, Esq.: *Dear Sir:* We have about two hundred of your new "Cone" Disk Stoves in use, (a part of them for nearly five years,) for warming Passenger Cars and Stations. I can truly say that they have given entire satisfaction. These Stoves possess many important advantages over any other we have ever used, viz.: for warming the floor and displacing the cold air in the lower part of the car, whereby they are rendered much more comfortable, especially for the feet, than by any other plan known to us. The Stove is more economical in the consumption of fuel, more substantial in construction, and consequently requiring less repairs than any other in use, and so securely constructed as to prevent fire from getting out of the stove even should the car be *overturned.* I cheerfully give my testimony in favor of this Stove, and commend it to all Railroad Managers. Yours, etc., A. A. FOLSOM, *Superintendent.*

Numerous other testimonials received from Railroads and other persons having these Stoves in use in Halls, Stores, etc., may be seen at office. Bolts are not required except for Cars and Steamboats.

Chilson's Improved Celebrated Cone Furnaces, for setting in Brickwork or in Portable Casings, Chilson's Unrivaled Double-Oven Brick Cooking-Range; Chilson's New and Splendid Arlington Portable Range; Chilson's very Superior Arlington Cooking Stove; Parlor, Office, and Store Stoves, Parlor Grates, Registers, Ventilators, etc.

Special attention given to putting up Furnaces and Ranges, and the ventilation of buildings in any part of the country.
☞ Nothing but strictly first-class work is manufactured by me. ☜

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MANUFACTURERS OF

FINE VARNISHES,

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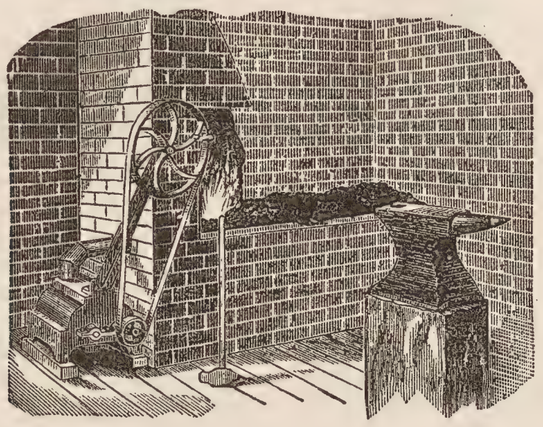
P. H. & F. M. ROOTS'

PATENT ROTARY HAND-BLOWER,



For Carriage Makers, Blacksmiths, and General Forging,

Can be operated by hand or power, and now used by many Railroads throughout the country, of which we name a few—namely, Camden and Amboy Railroad, Central Railroad of New-Jersey; Long Island Railroad; Staten Island Railroad; Belvidere Delaware Railroad; Vermont Central Railroad; Catasauqua and Fogelsville Railroad.

The advantages of this Blower over the old leather bellows, are:

GREATER DURABILITY.

Being made of Iron, it will outlast many pairs of leather Bellows.

GREATER ADAPTABILITY.

It gives a Force Blast that can be raised instantly from the slightest breath to the strongest blast.

GREATER DISPATCH OF WORK.

It heats much more rapidly than the Bellows, and is every instant under absolute control.

GREATER ECONOMY.

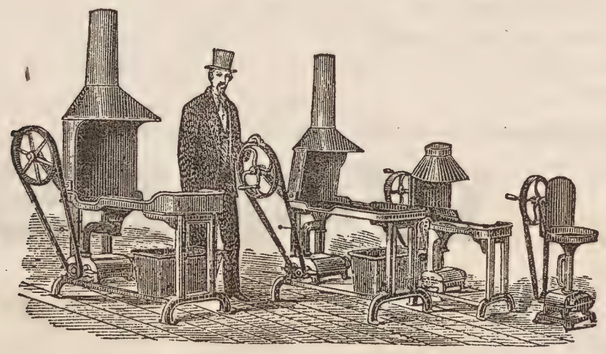
By producing a more perfect combustion, it saves a large amount of fuel, besides it occupies but a very limited space, and it ventilates the shop much better than bellows, as it takes the air from near the floor, the natural stratum of foul air.

Thus it saves *coal*, *time*, *space*, and preserves the *health*. No. 1 Blacksmith Hand-Blower will furnish ample blast for one large fire by hand or two by power.

ALSO

Patent Improved Portable Forge,

THE BEST IN THE MARKET.

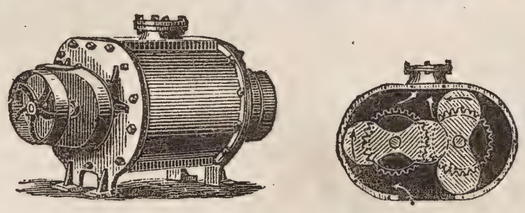


Can be operated either by hand or power, and now used by many Railroads—namely, Indianapolis and St. Louis Railroad; Lehigh Valley Railroad; Central Railroad of New-Jersey; Pittsburgh and Connellsville Railroad; Camden and Amboy Railroad and Ferry Co.; Boston, Hartford, and Erie Railroad; Raleigh and Gaston Railroad, and many others.

The Forge is compact, durable, reliable, convenient, easily moved, and yet has great heating capacity, as the blast is furnished by our Blower, making it in fact the best Portable Forge in existence.

P. H. & F. M. ROOTS ALSO MANUFACTURE

PATENT FORCE-BLAST ROTARY BLOWERS

OF ALL  SIZES,

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The above having been a regularly apprenticed and trained coach painter, and perfectly familiar with the difficulties and vexations of the Varnishing department of the craft, has, with the aid of his experience as a painter, and assiduous application as a Varnish Manufacturer, succeeded in producing a RUBBING Varnish, in which is combined *all* the requisites for the expeditious and perfect surfacing of work.

Also a WEARING BODY Varnish, which, for lustre and durability, stands unrivaled, after the severest trials, by any of FOREIGN or American manufacture.

Prices always as low as the use of the best materials, skillful workmanship, and proper age will admit of.

☞ **We ask for a trial of these articles because we have** EARNED **the right to do so.**

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VARNISHES

AND SOLE AGENTS FOR

POST'S COACH COLORS,

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JOHN A. ELMENDORF.

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THE

PETERSBURG CAR COMPANY,

Petersburg, Va.,

ARE NOW READY TO RECEIVE ORDERS FOR ALL KINDS OF

FREIGHT CARS.

These works are supplied with the most improved machinery, and have switch connections with broad and narrow gauge. They are prepared to furnish Rolling Stock with the utmost promptness, of the best materials and workmanship, and at the lowest prices.

T. L. H. YOUNG, President. JOHN W. FLEMING, Superintendent.

M. NIVER'S

POLISHING FLUID,

For Cleansing and Polishing

GOLD, SILVER,

PLATED WARE,

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MIRRORS,

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PLATE GLASS.

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COMPANY,

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LOCOMOTIVE AND MACHINE WORKS.

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Narrow Gauge Locomotives a Specialty.

OFFICE AND WORKS

AT CONNELLSVILLE, PENN.

Hitchcock Car Ventilator.

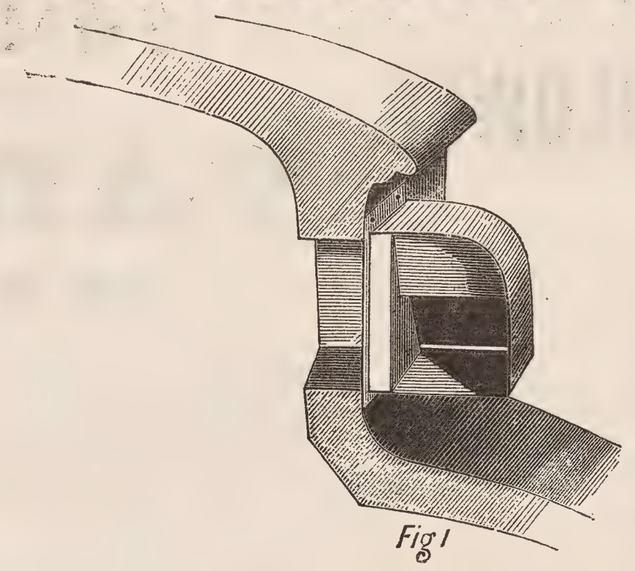
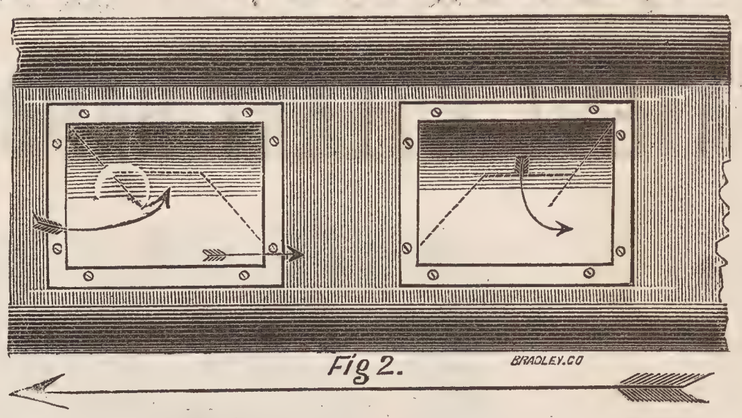


Fig 1



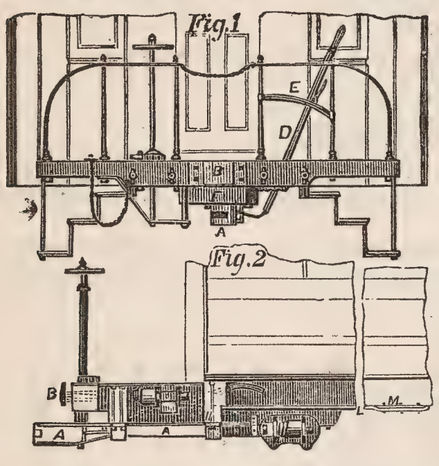
THE Ventilators are placed as usual in the car roof as shown in Fig. 1, their mouths facing alternately in opposite directions. those facing forward admitting the air, and those facing backward affording an exit. Fig. 2 represents a side section of the raised roof with two of the ventilators alternately arranged. When the car is moving in the direction indicated by the arrow, it will be seen, by the curved darts, that there is an ingress and egress of air constantly taking place. The operation of the ventilators is reversed with precisely the same effect, when the car moves in the opposite direction. The internal structure is such that the dust and cinders passing into the mouth of the ventilator are intercepted by striking against two shields, shown in Fig. 1, and indicated by dotted lines in Fig. 2, and are thus naturally thrown to the bottom, where they are carried out through a small opening as shown in Fig. 1, and by the straight dart in Fig. 2, a current of pure air being forced into the car at the same time through a lateral opening. The faster the car moves, the greater is the quantity of air admitted and expelled, thus securing a free circulation which does not subject the occupants to a direct current or draught. The ventilator is also noiseless in its operation. There is no clattering of valves, and no change is necessary when the car reaches its destination. Once put in place, it is always in readiness, and runs itself independent of all employees.

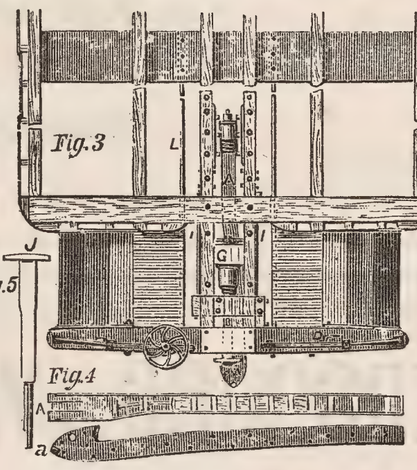
H. D. CARROLL & CO., Springfield, Mass.,

Proprietors and Manufacturers.

ROBERT HITCHCOCK, Inventor.

MILLER'S TRUSSED PLATFORMS. Compression Buffers and Automatic Couplers for Railroad Passenger Cars.





Office, 231 Broadway, (Rooms 4 and 5,) New-York.

Send for Illustrated Pamphlet, and call and see working models. E. MILLER, Patentee

DESCRIPTION.

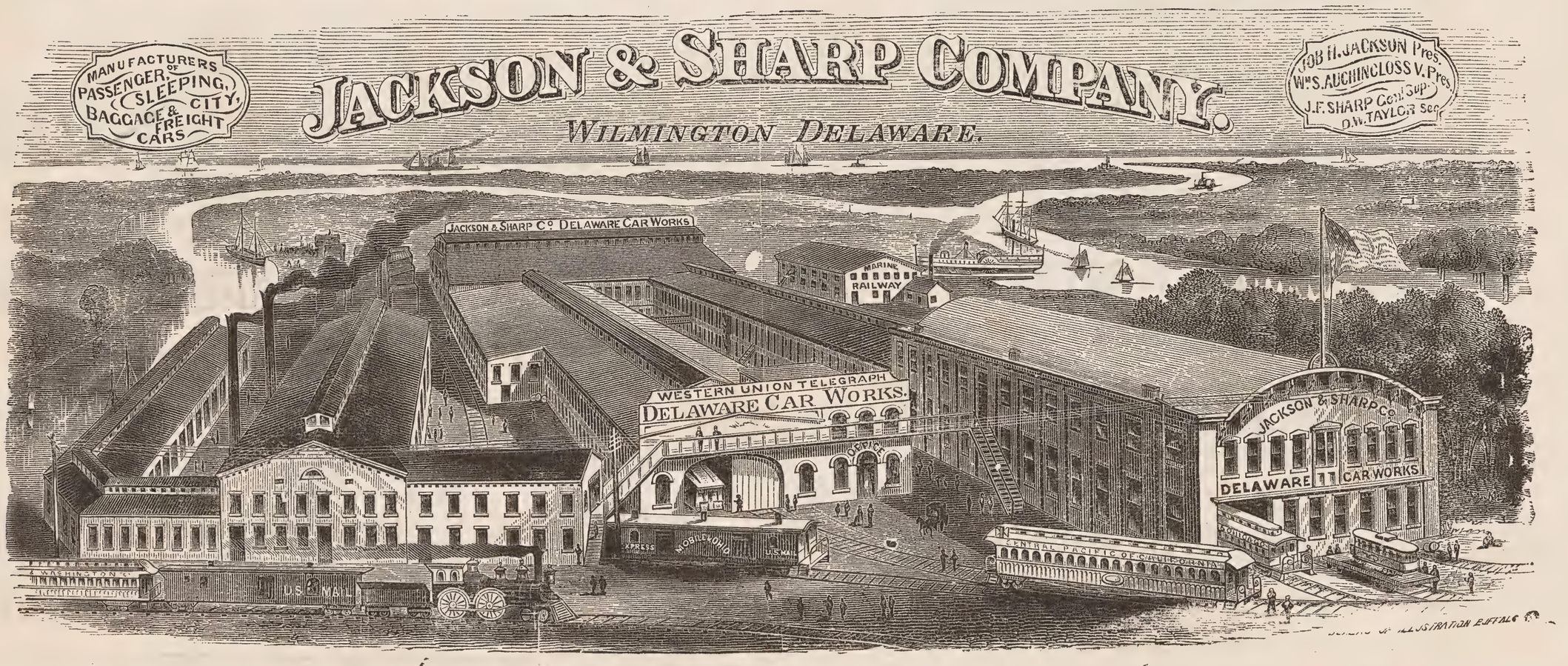
Figure 1 is an elevation; Figure 2, a longitudinal section; Figure 3, a plan of an end of a car to which the arrangement has been applied: and Figures 4 and 5 show top and side views of the "Hook" and "Buffer," drawn on a larger scale than that of Figures 1, 2, and 3.

The letters refer to the same parts in all the figures. A is the coupling "Hook," B the "Buffer," C the "Stop," D the "Lever," E the "Quadrant Ratchet," F the "Truss Beam," G the "Spring Beam," H the "Suspender Beam," I the "Upward Trusses," K the "Main Spring," L the "Downward Trusses," and M the "Bolster."

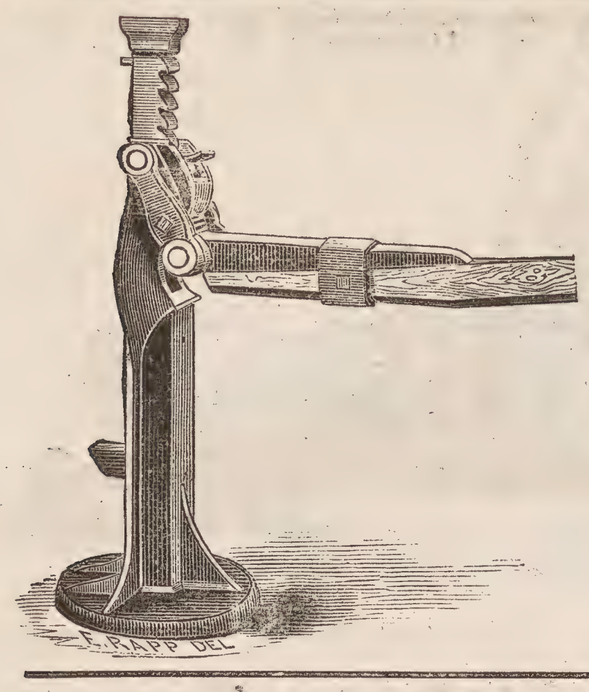
The Platforms, instead of being located below the centre line of the main sills of the cars, are placed *in* that ine, and held there by the Trusses I and L, so that the point of contact (in Buffers B) is *in* the said centre line and *not below* it.

The coupling "Hook" A is attached to the draw spring the same as the ordinary draw head, and at the same height above the track, but in such a manner that the outer end is free to move laterally for a short distance. The Coupling Hook projects beyond the platform. The Stop C is placed under the Buffer Beam to prevent accidental uncoupling. When two cars are brought together, the Coupling Hooks, from *their shape*, push each other aside, until the Buffers B are compressed hard on the Buffer Springs, then—*the points of the hooks having passed each other sufficiently far*—the Hooks are carried forward by their main-springs, and thus the "*Coupling*" and "*Compression*" are both effected automatically *and at the same time*, and without the use of links and pins. When two cars are thus coupled together, the *head* of the *Hook* of each car is under the Buffer Beam of its opposite car, and the platforms are close together, (about 4 inches apart.) The effect of this is, *one platform can not be forced over the other*, nor can a *child* fall between the platforms; the dust and rain are nearly all shut out; the "Compression" makes the train run steadily, and prevents all jerking at starting and stopping.

DELAWARE CAR WORKS,



Manufacturers of Sleeping, Saloon, Drawing-Room, and Passenger Cars. Employs 900 Men.



Leffel's Patent Lever Jack.

Patented Dec. 10, 1850; Patented Nov. 15, 1864; Renewed Nov. 28, 1864.

ADAPTED TO ALL KINDS OF LIFTING,

BUT ESPECIALLY TO

BRIDGE AND RAILROAD WORK.

Nearly all the Railroads in the United States have these Jacks in use, and the testimony in every instance shows a very great economy in

LABOR, TIME, AND EXPENSE.

Orders solicited and promptly filled. Address,

JAMES LEFFEL & CO.,

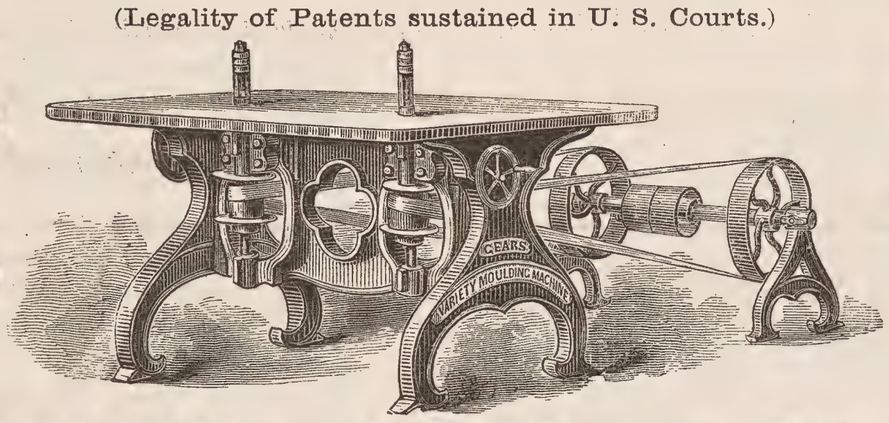
Springfield, Ohio, and
109 Liberty St., New-York City.

A. S. GEAR,

Sole Owner and Manufacturer of the Gear Variety Moulding Machine, and Manufacturer and Dealer in all kinds of

(Legality of Patents sustained in U. S. Courts.)

56 to 62 Sudbury St.,



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Wood and Iron Working Machinery,

STEAM ENGINES AND MECHANICAL SUPPLIES.

RAILROAD SHOPS FITTED OUT COMPLETE.

S. P. SMITH,

ORIGINAL MANUFACTURER OF

NEWARK VARNISHES,

369, 371, 373 and 375 Mulberry Street,

NEWARK, N. J.

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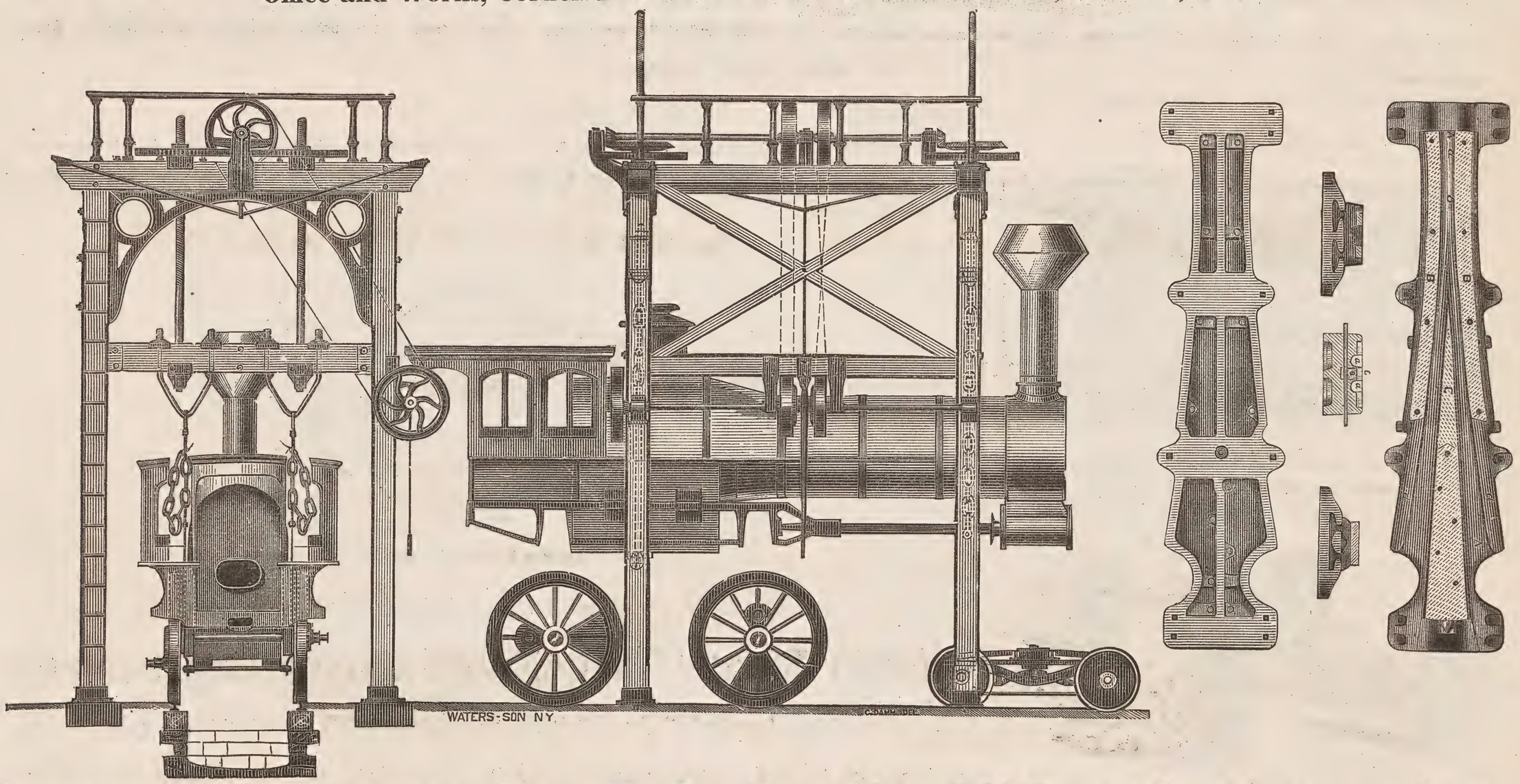

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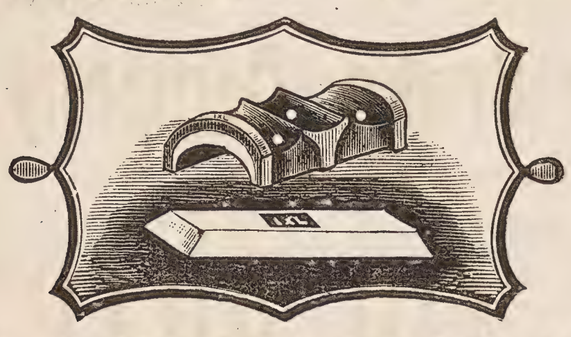

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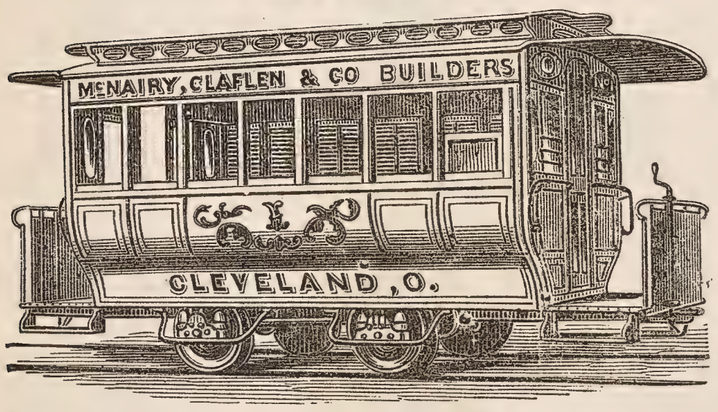

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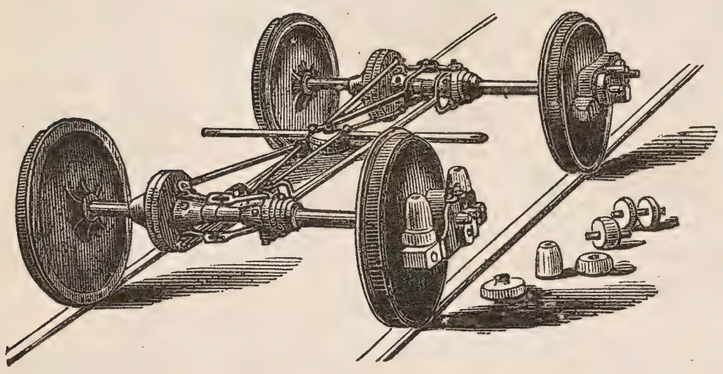

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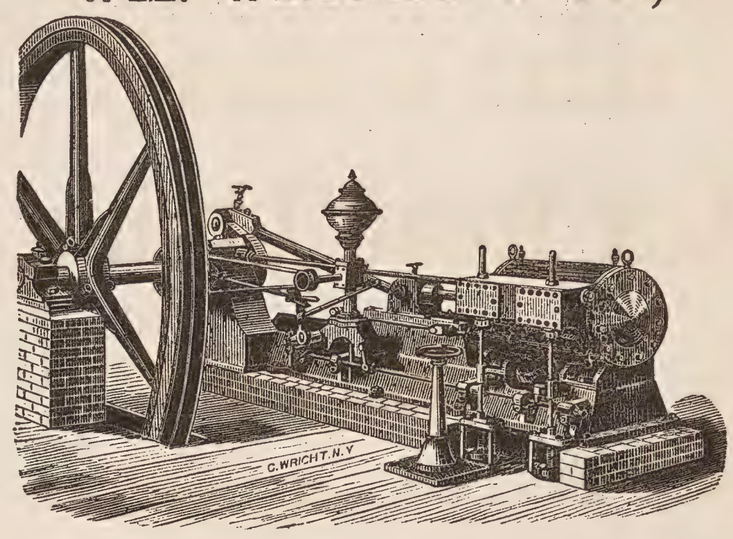

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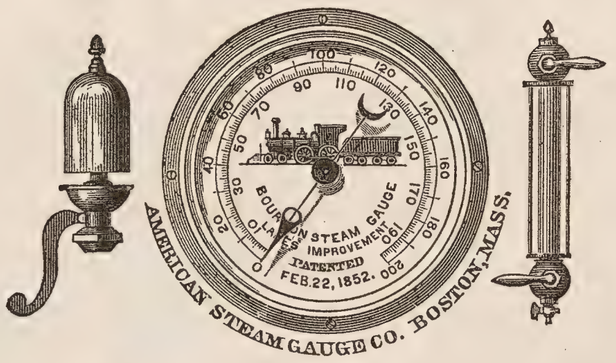

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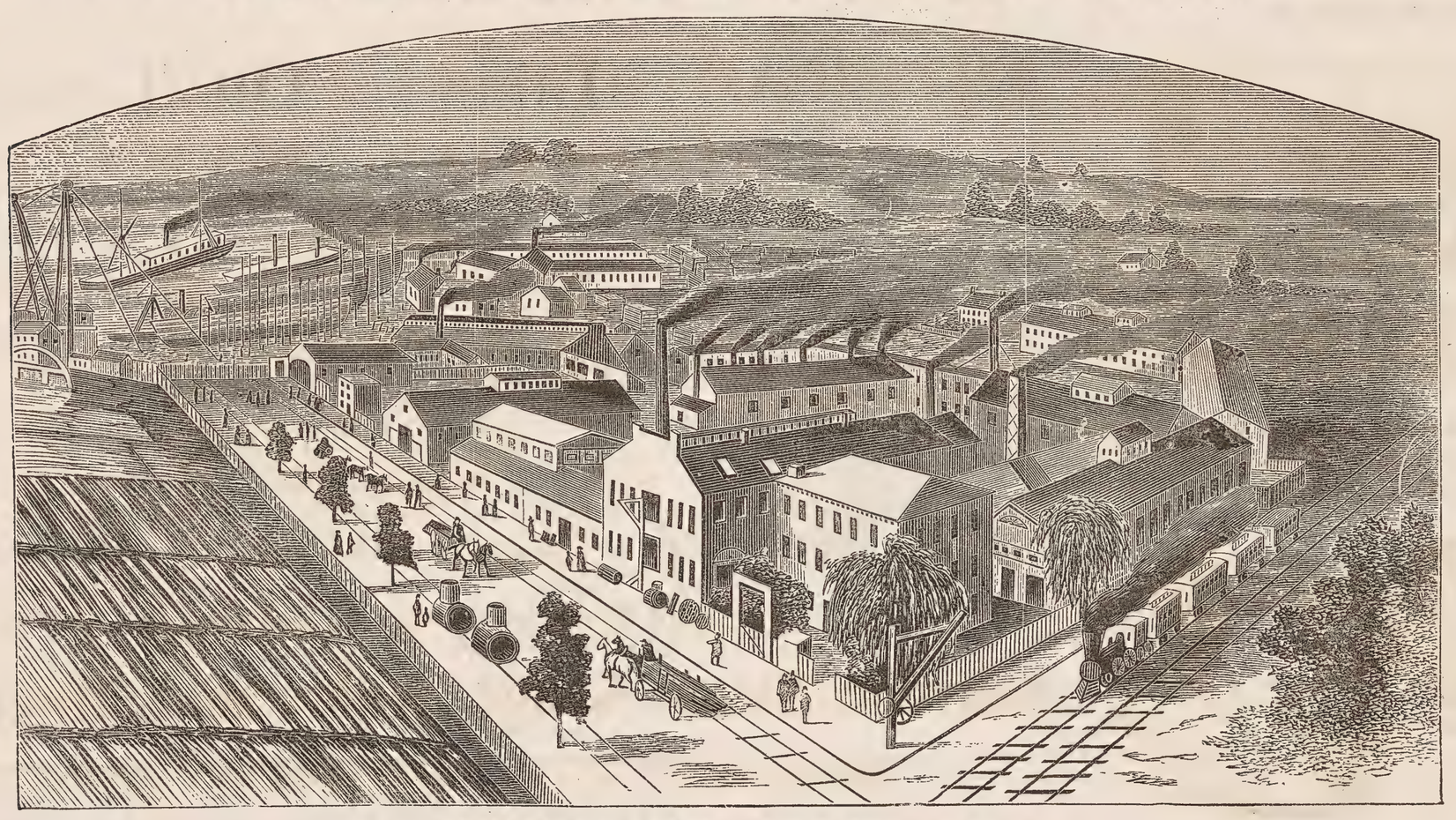

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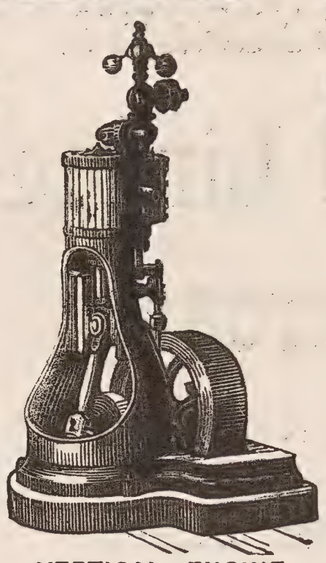

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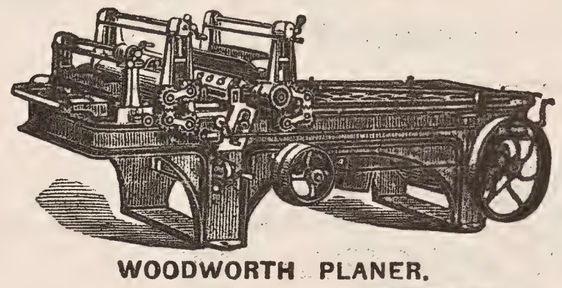

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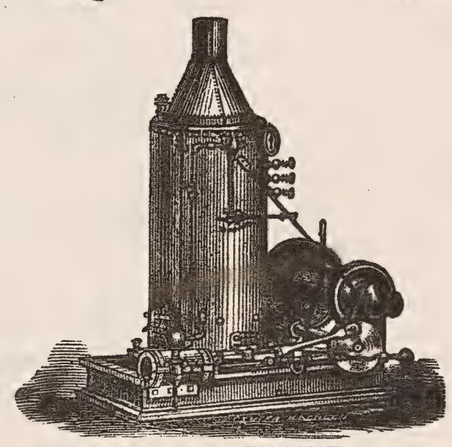

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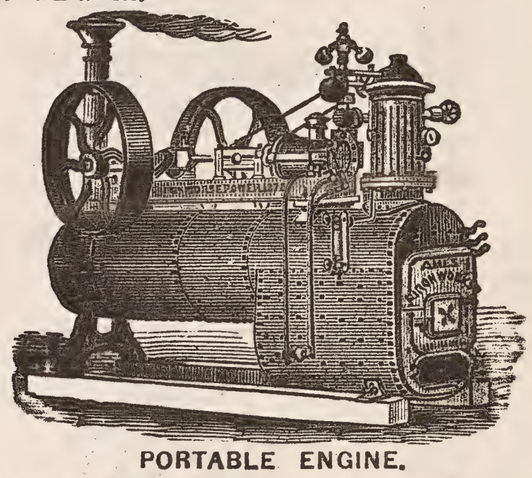

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Vol. IV.
No. 10.

OCTOBER, 1873.

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Nasby Turned Granger.

THIS enterprising individual has temporarily left the post-office business, and identified himself with the farmers' anti-monopoly movement, as will appear from the following extracts from a letter written by him to the Toledo *Blade*, and dated "Beet Stashen, Illinoy."

"I am up here in the anti-monopoly business, groanin over the burdens piled upon us farmers, and damin with all the vehemence that's into me, the monopolies that is suckin the life-blood out uv the honest laborin classes. We hev at the Stashen a noble coterie uv sympathisers with the hard-fisted yeomany—a most gorgeously sympathisin set ez ever I see, and so afflicted are we at the troubles wich the perdoosers are labrin under, that we hold meetins perpetooly in the room back uv the Jackson Hotel, to consider em.

"The ledin sperit among us, aside from me, is a veteran sympathizer with labor, wich his name is Pettus. Abslum Pettus wuz originelly a shoemaker, but early in life developed a talent for holdin offis. He wuz elected sheriff of the county, and the bench wich knowd him wunst, immejitly knowd him no more forever. Mr. Pettus goes into the movement agin oppressive monopolies and sich, with all his heart, sole, body and strength. He bleeves in the nobility uv labor; he holds that labor hez not its proper reward, and ez for his part he will enter into a croosade agin the bloated monopolists, and in behalf uv the horny-handed agricultoorists of the country, with all the zeal uv his trooly fervid nacher. One uv the most techin sites in nacher is to see Pettus a leaning on a bar, and a discoursin on the grandjer uv labor. He sez that if the farmers, the hard-handed labrin masses of the county want a candidate for Auditor who loathes and hates the oppresshun uv labor, in watever form it may come, he is their man. Mr. Samuel Blather is another uv the hard-handed who is with us. He don't own no farm hisself, nor he don't buy nor sell any prodoose nor any thing else, nor hez he any pertikeler bizness, but he feels there is an incubus wich ways onto the labrin man, and, for one, he feels like puttin his shoulder to the wheel and histing it. Mr. Cephas Billins also, feels in his sole that they, the farmers, are opprest. He aint jest shoor ez he knows wat their wrongs is, but he persoomed it had suthin to do with monopolies or suthin uv that sort; but watever it wuz, he stands ready to denounce it.

"Last week we held a meetin in the back room, and resolved ourselves into a Grange, with Pettus, Blather, Billins and myself as the prinsiple offisers. Hevin thus got the organizashun all safe, and in proper hands, we ishood an address to the farmers of the county to come in and jine. I urged em to let the farmers organize it, but my co-laborers declined. They sed they preferred to make certain that the organizashun shood be in the hands uv the troo frends uv the labrin classes. They didn't care to take any chances. We hev assoomed a costoom in accordance with our new agricultooral deparcher. We hev heavy stogy boots, bloo over-hauls tucked into em, hickory shirts, and broad-brimmed chip hats. We each uv us carry a black-snake whip, instead uv a cane, and sprinkle hayseed in our hair every mornin. Blather is so enthoosiastic that he daubs clay on his boots every mornin, and Billins took a whet-stun and rubbed the inside uv of his hands three days industriously to get up a satisfactory callus. We address each other ez Farmer Billins, Farmer Blather, Farmer Pettus, and Farmer Nasby, and our conversashun is principally about agricultooral matters. The other cusses have more zeel, however, than discreshun. I hev other troubles with em. Pettus wuz agoin out to address a Grange in cow-hide boots, check shirt and overhauls, ez a simple plain farmer, an unostentashus son uv toil, with a diamond ring on his little finger. I hev to watch him and make him take it off and put it in his vest pocket afore he begins to speak."

The Care of Bearings.

THE care of bearings can hardly be considered as belonging to repairing machinery, and it is thought best to notice it as a separate matter.

To take care of the bearings of a high-speed wood machine, is one of the intricate and difficult things which the operator has to do, and even after years of experience he can seldom tell at once, or with any certainty, the cause of a bearing heating.

When a bearing becomes hot, a machine stops; if on the engine or line shafts, all the machines stop; so that it is an important matter to know how to treat it. To remove the cause is of course the best plan, and the first thing to be done; but the cause is sometimes not so easy to determine. Aside from becoming dry for the want of lubrication, the cause of heating may be want of truth in the shaft, either from not being round, or from being sprung. It may be for the want of a fit, and lack of surface, from being too tight, or from over-pressure—that is, too much pressure for the amount of surface.

Among all these the question is first to tell with which the trouble lies; and next, how to apply a remedy in the quickest and surest manner. When a bearing heats, if the shaft is small, and can be freed from gearing and belts, first try to shake it with a lever, or otherwise, to see if it is loose enough; if so, next screw down the cap until it binds a little, and then turn the shaft by hand, watching carefully whether it binds at one place more than another; the least irregularity can be discerned in this way, and indicates that the bearing is not round, and needs turning. If the shaft is crooked, it is detected by holding a point against it while running—a matter that any one understands.

If none of these things appear, next take the shaft out and examine the bearing; see where the shaft bears, whether at one end only, or on the sides. Examine the cap to see whether it shifts, so as to bind on the sides. This want of surface is the most frequent cause of heating with the bearings of new machinery, and, perhaps, the most common in bearings that have been remoulded; if out of truth, scrape off the points where the shaft bears until it touches throughout, as explained previously. Use good oil in starting, and if necessary, cool the bearing for a time with water.

Never place any faith in compounds of plumbago, salt, soap, or any thing of the kind; they may have claims as lubricants, but it is generally a waste of time to try to conquer a hot bearing by any other plan than to correct the mechanical defect which lies at the bottom.—*Richards's Operator's Hand-Book.*

German and Austrian Locomotives.

PROFESSOR THURSTON, in one of his letters from Vienna to the *Scientific American*, thus describes these machines: "They are of many types, most if not all of which are well known at home. They are now usually fitted with the American cab, a detail which the contin ental builders have been more prompt in adopting than have the British. The frames, instead of being made of forged bars of rectangular section, as is customary in the United States, are cut out from rolled plate, which, for heavy engines, is at least thirty millimeters (one and two tenths inches) thick. The cylinders are usually outside, and the valves are frequently driven by eccentrics placed outside the crank-pin, and without the intervention of rock-shafts. The boiler is now generally made with that portion surrounding the fire-box considerably enlarged, in order to obtain a wider grate and a higher steam space over the crown-sheet. Instead, however, of making the top of this portion semi-cylindrical, as is the practice in the United States, the top and sides are made flat, the outside of the boiler being thus made like a rectangular box with rounded corners. The cylindrical part of the shell surrounding the tubes is connected with the enlarged part just described, frequently by a single sheet which is cut out and flanged on the one side to take the former, and is flanged around the edges on the other side to meet the shell surrounding the fire-box. This makes a very perfect and strong connection between the two portions of the shell, and, at the same time, forms an expansion-joint. It is evidently a favorite method of construction here; but whether better than our American method of accomplishing the same result it is difficult to say. These flanged sheets, such as have just been described, make rather a neat piece of flanging, and seem to be favorite *pièces de résistance* with the principal exhibitors. A number are exhibited in steel, and among these are some of the best specimens of such work to be found in the exhibition. One of the very best is shown in the Creusot exhibit, where also is the most beautifully finished locomotive engine to be found in the building. As such finish can only be given to the very best of material, this engine probably stands unequaled in material and finish by any thing here. Steel is employed for nearly all parts which were for-

merly made in wrought iron. The favorite grade for the locomotive builder's purpose seems generally to have so small a proportion of carbon as to be properly iron. This proportion frequently falls to one quarter of one per cent. This metal, when made from good pig-iron and with proper care, is much stronger than merchant iron, except, possibly, in rare instances and with the very best and highest-priced brands; it is perfectly uniform in strength and quality, and takes a magnificent finish. This metal has a tensile strength of from sixty to seventy thousand pounds and upward, and stretches more than one fourth before finally breaking off, and can be relied upon to do this invariably, say those who are using it. Each piece is also uniform in structure and in strength throughout."

The Locomotive Engine considered as an Agent of Civilization.

BY J. M. BLANCHARD.

It may be but the utterance of a trite thought to say that the locomotive engine stands in the front rank of agents for the promotion of the new civilization of the world. Whether such is or is not the case, it seems that the fact is assented to rather than received as a conviction of the mind. If we allow our minds to revert to the time when there were no railroads, and consequently no locomotives, and consult the history of those times, we shall be able to form an idea of the hindrances that stood in the way of the rapid progress of civilization; for, as all know, it is a plant of slow growth, and only takes root in new soil as the advantages for the transmission of its germs from the points where they originate to distant places are multiplied. The progress of any age or country must depend upon the education of the people of such age or country, and hence, any thing which promotes the one, must of course foster the other; for, as Burke says, "Our manners, our *civilization*, and all the good things connected with manners and with *civilization*, have in this European world of ours depended upon two principles. . . . I mean the spirit of a gentleman and the spirit of religion." If, then, I can show that the locomotive is a means of the spread of gentlemanly habits and of religious truths, I shall have proven that it is a great promoter of what I have designated as our new civilization, by which I mean the kind which has been in vogue since the introduction of such machines. In seeking for an illustration of the effect of the locomotive upon the civilization of a people and a country, I can find no better or more honored name to cite as an example, than that of Robert Stephenson, who, from the time when he became able to carry picks from the mines to the "smithery," had been diligently at work in and around the mines of Killingworth, he having never been more than a day's journey from there previous to the autumn of 1821, when he made his first trip to London, dressed in his coarse, ill-fitting clothes, made by the pitman's tailor. It is not to be supposed that this boy Robert had at that time any conception of the part he was to play in the civilization of his country and of the world; for he was at that time only an apprentice to Mr. Nicholas Wood, who was the "viewer" of the Killingworth coal-mine.

Shortly after this trip to London, Mr. George Stephenson, Robert's father, received the appointment of Chief Engineer of the Stockton and Darlington Railroad, and Robert was called upon to assist his father in the work. To the lasting credit of the father be it said, that, when the survey was completed, and the map thereof made, the name of Robert Stephenson was affixed thereto, by his father's express order; and it was this and other acts of kindness upon the part of that father, that so closely bound his son to him through his subsequent life.

In 1828, the history of the locomotive as an agent of civilization properly commences; for it was at this time that the efforts of Mr. Robert Stephenson, looking to its improvement, began in real earnest, it being shortly after his trip to America. The especial object he had in view was to so improve the then existing machines as to enable him to procure their introduction upon the Liverpool and Manchester road when it should be completed. It should be borne in mind that the locomotive was at this time in a very imperfect condition, those then in use on the Killingworth and Darlington lines not being able to attain a rate of speed of more than four or five miles an hour, in which condition they could not carry intelligence faster than other modes of transportation then in use.

About this time Mr. Stephenson introduced into a locomotive boiler the small tubes, which enabled him to construct an engine capable of traveling twenty-five miles in an hour, and thus to become to some extent the agent in our civilization that it now is. It is not the intention of the writer of this article to convey the idea that the object of Mr. Stephenson was the promotion of the educational interests of his country, as it appears from all that has come down to us, that he was actuated by such motives as govern us all—the advancement of the financial condition of himself and the people of his vicinity, and the promotion of the general welfare of his country; but like many benefactors of the race, he "builded greater than he knew," as the result clearly shows.

The effect of this improvement upon the people of England was truly wonderful. The completion of different lines of railroads was stimulated thereby, and the facilities for intercommunication were increased a thousand fold over what they had previously been. And so the people of the mining and the agricultural districts were enabled to reach the cities and learn the refinements thereof, and the people of the cities were induced to visit the country, and there behold the beauties of nature; all classes thus having their conditions improved.

I come now to speak of what the locomotive has done for education and civilization in our own country, the condition of which at the date of its introduction is known to all intelligent readers. Vast in extent, a large portion of it uninhabited, while other portions were but sparsely settled, the opportunities for communication between the settled and the unsettled portions of rare occurrence, it is not wonderful that the civilization of our frontier towns has been criticised; for without contact of mind with mind, no general advancement can be made. And the same law obtains here as in the realm of matter, namely, that when you undertake to improve the finish or the appearance, you must bring it in contact with some agent which is capable of improving its appearance or condition. In due course of time, the Boston and Lowell road was built. After this, the Toledo and Adrian, the Baltimore and Ohio, and so on, until our country has become a net-work of such roads, the locomotives upon which have carried civilization and refinement from the centre to the circumference of this vast territory of ours.

It will not be denied that, up to the time of the introduction of the magnetic telegraph, this machine, and its twin sister, the steamboat, had done more than all other mechanical devices, except, perhaps, the printing-press, to advance the civilization of this country; and as it now stands, if we look a little below the surface, we shall see that this powerful ally, the telegraph, is only an ally, after all; for who believes that this wonderful agent for the transmission of intelligence would now be enjoying the reputation it has, but for the locomotive? How could our lines of telegraph wires from Maine to California be kept in repair, but by the facilities afforded by this invaluable machine? It clearly could not be done; and it is no exaggeration to say that our country would not now be in the enjoyment of one half the present advantages derived from the telegraph, had it not been preceded by such an agent. Newspapers, properly conducted, are powerful agents in promoting the civilization of our country; but if we examine those that were printed in the days of pony expresses, and before the advent of the locomotive, and compare them with those that have been published since, we shall find that the publishers and editors of the latter are largely indebted to the facilities of transportation afforded by this machine, for their success. Is an eloquent sermon preached by a learned divine; is a thrilling speech made upon politics, or in the halls of legislation; or is some new and important discovery made in science?—the telegraph is brought into requisition, and gives a synopsis of the same; but the locomotive is depended upon to carry the full printed report to millions of readers who would never see or even hear of it without its aid; and so their minds are improved and their civilization is advanced, just in proportion to the ennobling sentiments uttered by the speaker.

There is another stand-point from which to view the effects produced by the locomotive, and that will here be designated the domestic one, because it so vitally affects the domestic relations of the people of this country. When the writer of this was a boy of fifteen years, a family living in the same town with him disposed of their property and prepared to go West, the place of their destination being what was then known as the "Holland Purchase," a tract of land lying south of Buffalo, N. Y. At the time appointed for the family to leave, the people of the entire New-England village gathered together at a designated spot, and examined with great care the horses and wagon that were to carry friends to a country so distant that no one present had the least hope of ever seeing them again. The parting between this family and their assembled friends made an impression upon the writer's mind that all of the years that have since passed have not effaced. Such wringing of hands, shedding of tears, and finally, speaking of farewells forever, I have not since seen. A few years after this incident, the writer, yet a young man, was enabled to visit these friends of his early youth, and for this was indebted to the locomotive; for it was that invaluable machine that furnished the power to move him through the beautiful cities, towns, and fields of Central New-York.

What we have experienced of the humanizing and civilizing effects of the locomotive in this respect, others have felt, and perhaps to a far greater extent; for who does not know that the civilization of New-England, of New-York, and of the Middle States, has been transferred to the more Western States mainly in the minds and hearts of the sons and daughters of those States, from which they have migrated, and domestic ties have thus been kept unbroken in many instances, while in some cases where such ties had been broken, as it was believed forever, they have been reunited; and now, as each year passes by, thousands from the East visit the West, and others from the North visit the South, and *vice versa*, who, but for the locomotive, would never have seen each other; and so the civilization of the whole country is advanced, and the triumph of the "Tea-kettle upon wheels" is complete.

New Cattle-Car.

The Pittsburg *Commercial*, referring to the present barbarous method of transporting live stock from the West to the sea-board cities, has the following notice of a new stock-car invented by J. T. McCarty, of Salem, Ohio:

"The car is thirty-six feet long, and has accommodation for sixteen head of cattle or horses. Each animal has a separate stall, and the gates are on slides and move with the cattle. They stand eight in a row, on each side of the car and all facing outward. The hips of the animals come together, and they are exempt from all hurts or bruises. The car is so arranged that the stock can be fed and watered on the way. This car has been in use since May last, but it is now being run from Chicago to New-York, over the Pennsylvania Central, at the request of Mr. Cassatt, general superintendent of the road, for the purpose of making a thorough test of its advantages. Mr. McCarty loaded two of his cars at Chicago, the thirty-

two cattle weighing 42,180 pounds, or considerably over the average weight. The cars arrived here yesterday, and attracted great attention at the stock yards, while they remained there. The cattle were in excellent condition, having been regularly fed and watered, and a number of them were lying comfortably in their stalls, taking their ease. Contrast this method of shipping with that now prevailing on our railways, it being the custom to run the cattle through from Chicago to Pittsburg without food or drink, and then from Pittsburg to New-York without feeding or watering. Leaving out of view the terrible sufferings of the animals and the unwholesome character of their flesh, the owners of cattle will make money by having this car brought into general use, in the single item of shrinkage alone. The average weight of an ox is 1200 pounds, and the average shrinkage is put at 10 per cent, or 120 pounds per head. In 1872, over one million head of cattle were received at New-York, Philadelphia, Baltimore, Albany, Washington, Boston, and Providence, so that there was a sum total of 120,000,000 pounds of beef starved, goaded, and jolted out of the cattle brought to the above-named seven cities in a single year. Putting even its lowest money value on this wasted beef—the wholesale price—and it runs to over $8,000,000 of annual loss. Some authorities estimate the shrinkage at considerably more than ten per cent, and those most interested in keeping it at a low average admit it to be eight per cent. Now Mr. McCarty will guarantee, by the use of his improved car, to save fifty pounds shrinkage per head between Chicago and Philadelphia, or 800 pounds per car. Cattle-owners can figure the value of this saving for themselves. At seven cents a pound, it would amount to $56 a car. The inventor has tested his car sufficiently to give him the fullest confidence in it, and we are glad to know that so influential a corporation as the great Pennsylvania Central has determined to demonstrate its merits with a view to its adoption if successful."

Lake Shore Railway Repair-Shops.

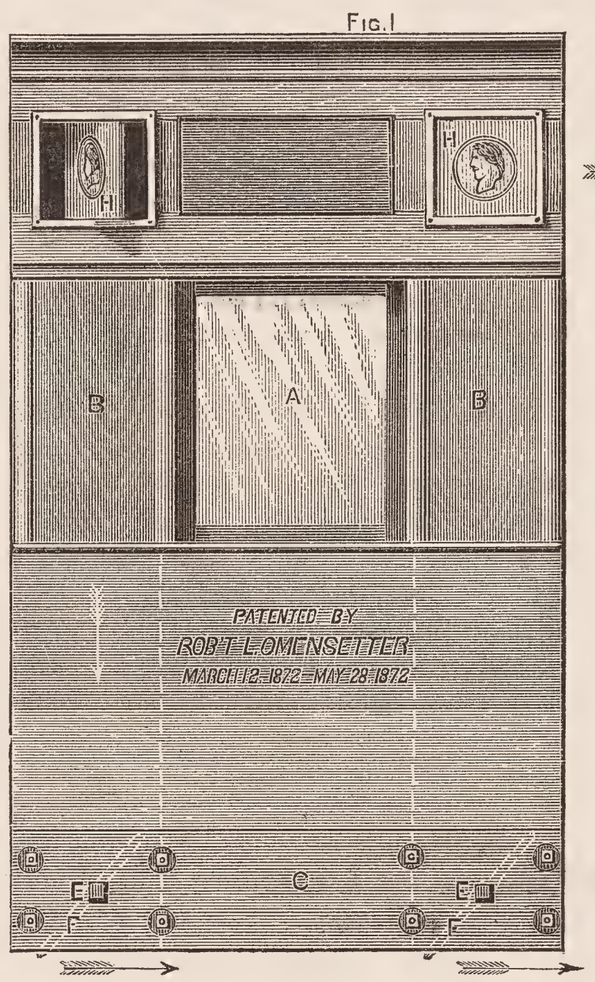
THE repair-shops of this road are situated at Elkhart, 101 miles east of Chicago. They consist of a boiler-shop, blacksmith-shop, grinding-room, carpenter-shop, foundry, rail-mill, etc. The foundry turns out about 32 wheels per day, from Salisbury iron. The rail-mill is used, not for making but for mending rails. This is done by Brine's rolls. The rails are mended by welding a piece of iron made out of a bar 2½ inches wide by ¼ inch thick, and about 2 feet long. These pieces are made with a peculiarly shaped forked end, the prongs of which are bent down on each side and under the head of the rail, so as to hold it in position while in the fire, and when it is passed through the rolls and is being welded on. The pieces used for the ends of the rails have a fork at one end only, while those for the middle portion of the rail have them at each end. These pieces are placed on top of the rail and secured by the forks, and the rail is then heated to a welding heat at the place where it needs mending. When it is heated, it is passed through a set of rolls, one of which presses the piece to be welded down on top of the head of the rail, thus causing the two to unite firmly. Two other disk-like rollers, whose planes are horizontal and axis vertical, press the roll in the web, thus preventing it from being too much upset while the process of welding is going on. The rail is then laid on its side, and passed through two other grooved rolls similar to those used in manufacturing rails. The grooves are made of the form of the rail, and reduce the part which is being moulded to the proper size and form. The rail is then cut off by a circular saw to the proper length and straightened, which completes the mend. Twenty-five men are employed in the rail-mill, who mend 110 rails per day.

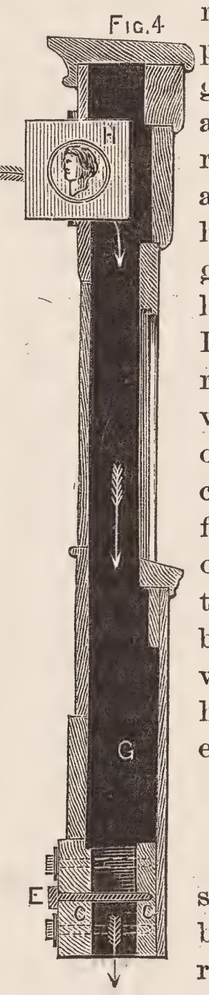
THE shops of the Pennsylvania Railroad Company, at Altoona, are to be very much enlarged.

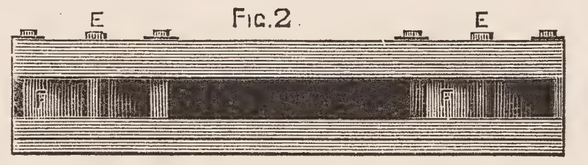
Improvement in Car-Bodies.

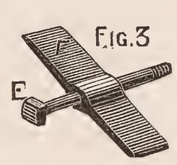
THE cuts represent an improvement in the construction of passenger-cars, invented and patented by Robert L. Omensetter, of Philadelphia. The improvement consists of a modification of the ordinary methods of exhaust ventilation, by framing the car-sides so as to provide a vertical flue or passage through which the heated or impure air is conducted from the several exhaust-registers in the roof, and discharged under the floor-sills. The advantages claimed for this method consist in the ventilation it affords to the inner wood-work of the walls, preventing the accumulation of moisture, and keeping the joints free from water, thus protecting the timber from premature decay.

Fig. 1 represents a side elevation of a portion of the interior of a car-body. Fig. 2 is a bottom view of the same, showing the two sills and the location of the flue-valves between them. Fig. 3 is a detached view of the flue-valve and pin on which it works. Fig. 4 is a vertical section of the car-side, showing









the form and dimension of the flue and the direction of the air-current as it passes from the register in the roof to the bottom of the car-body. A represents the car-window; B, the inside panels; C, the sills; E, the valve-pins; F, the valves; G, the flue; and H, the register.

The lower ends of the posts, instead of being connected with single sills in the usual way by mortises and tenons, are placed between two sills, and are fastened by screw-bolts as shown, thus preventing the collection of water, which is apt to find its way into the mortises in rainy weather. A downward draught of air through the flues and the open space between the sills in which they terminate, is secured by the movement of the car in the direction of the arrows Fig. 1, which motion tends to create a partial vacuum; while at the same time the air is prevented from passing up the flues by the valves F, hung in the bottom between the sills, as shown. The draught of air toward the rear of the car, while the car is moving, keeps the valves in the position as represented in Fig. 1, thus preventing an upward current, while there is always a space at the rear of the valves for the escape of the downward current.

The inside sill can be made so as to combine both sill and truss-plank, thereby dispensing with braces, which are necessary in the construction of cars in the ordinary way. The belt-rail can be made narrower at the flues, so as to allow the air to pass without obstruction. The mode of connecting the sills with the posts, as above described, is claimed to be cheaper than the usual method, and the frame is stiffer by the use of two sills set apart, than it is with but one sill of equal thickness with the two.

Any farther information may be obtained by addressing the inventor as above, No. 1534 Summer street, Philadelphia.

Narrow Gauge Vindicated.

A WRITER in the San Francisco *Pacific Rural Press* sets forth the advantages of the three-foot gauge, as shown in the successful operation of the Denver and Rio Grande road, as follows:

"The company saved about 37½ per cent in the first cost of construction and equipment of its road, by reason of the adoption of a gauge of 3 feet instead of 4 feet 8½ inches. This is a clear saving, because the road is equally well built in every respect, and its capacity as great as though it had been of the wider gauge. The passenger-cars have proven comfortable, and at least as steady in riding as those on the wider roads, and the freight-cars have carried satisfactorily all classes of traffic, bulky and concentrated. There has been no accident on the road, and the centre of gravity of the cars is so much lowered that one could hardly occur that would be traceable to the gauge. In addition to first and second class passengers, the road has carried during the past year freight of great variety in character. Besides heavy articles—coal, ores, stone, lumber, iron, hardware, grain, etc.—it has carried wool, furniture, hay, wagons, and other freight of the lightest and most bulky nature: while of course, on this last class, the benefit derived from the gauge by the saving in dead car-weight has not been so great, yet there is no class of freight upon which the proportion of paying to non-paying weight has not been in favor of the narrow-gauge as compared with the wide.

FREIGHT-CARS.

"With concentrated or heavy freight, which constitutes on this, as on nearly all railroads, the great bulk of the tonnage to be transported, the advantage realized has been 35 per cent. That is to say, thirty-five hundredths more freight has been regularly carried on the narrow-gauge rolling-stock, with the same total weight of cars and load, as on the broad gauge. This can be most readily seen by observing a train of 16 loaded cars (which weigh say 8½ tons each, when empty) arriving at Denver on the broad-gauge roads, and their contents transferred to the Denver and Rio Grande Railway. The same freight is placed in 20 narrow-gauge cars, the empty freight of which is somewhat less than 3 tons each. But it very often happens, in the ordinary course of railroad business, that cars are very frequently not loaded to their capacity, in which event the narrow-gauge receives a proportionately greater benefit. For instance: if from any station there was a load of but 5½ tons to carry, the narrow-gauge car would weigh no more with this load than the broad-gauge car would, entirely empty.

The narrow-gauge cars are not too light to stand the rough usage for any length of time; because, as all the other cars on the road are likewise light, they are not subjected to any more momentum or crushing force in proportion to their strength than a wide-gauge car is where all are heavy; and further, it is a well-known fact in mechanics, that small structures are much stronger in proportion to their weight than large ones. The cars have proved large enough to carry even the most bulky kinds of freight, such as wool, furniture, etc. Cattle and horses can be carried; and although the road is not yet constructed sufficiently far south to obtain much cattle business, yet in time this may be looked for as furnishing a large traffic, and the road is preparing for it. The stock-cars already built are 6½ feet wide, 28 feet long, weigh

8500 pounds, and carry nine head of cattle. The animals stand lengthwise with the car, which is better for them than sidewise, as they can steady themselves more readily. The dead weight of car to one animal, is in the case of the wide gauge, 1357 pounds, and narrow gauge, 844 pounds. But for short cattle, the cars are wide enough to carry them in the usual way, in which case the narrow-gauge car carries 13 head of cattle, or within one of as many as the broad gauge.

PASSENGER-CARS.

"The cars are comfortable, well ventilated, handsomely fitted up, and the 25,000 passengers who passed over the road last year certainly rode as steadily, and as far as could be judged, altogether as satisfactorily as on any wide-gauge road. As far as space is concerned, the whole passenger travel of Europe is carried in compartment cars practically less roomy and not nearly as well ventilated. The first-class cars seat three passengers across the width of the cars, two on one side of the aisle and one on the other—an arrangement which, by increasing the proportion of passengers who can have seats by themselves and adjoining the window, makes it much easier to fill all the seats. Even three seats are not occupied on the average in wide-gauge cars. A certain number of passengers are acquainted, and wish to sit side by side; others prefer to be alone. It is difficult by supervision to stow away passengers as one would freight, the traveler taking one seat, and his carpet-bag the other, thus preventing intrusion. The car adopted by the company appears to suit the average conditions of travel better than one of either two seats or four. The first class narrow-gauge car is 7 feet 2¾ inches wide inside; 35 feet 4½ inches long, weighs 7½ tons net, and seats 36 passengers—an average of 417 pounds of car-weight to one passenger. The broad-gauge day-car weighs 19½ tons, and can seat 56 passengers—an average of 696 pounds of car-weight to one person.

SLEEPING-CARS.

"Sleeping-cars are used with much greater advantage than on the wide gauge, because, although people unknown to each other can generally with some effort be made to sit on the same seat, they can not well be made to sleep in the same bed. The practical result is, that the traveler pays for two beds, and the railways carry the extra weight and width for two beds to one person. So it happens that, while the present Pullman car weighs from 25 to 30 tons, it carries on an average but 15 customers. The Denver and Rio Grande Company has not a length of road sufficient to require night travel, but when it has, sleeping-cars will be introduced which will weigh less than 10 tons, and accommodate 20 travelers. The couches will not be so wide as to allow the sleeper to roll uneasily with the movement of the train; but instead of paying for two berths, he will pay for but one. They will be every whit as comfortable as those on the wider gauge, and still leave ample space for the aisle. When a single person wishes, as frequently happens—especially in the case of ladies—to take an entire section, he will pay for two berths only, instead of four, as at present.

SPEED AND SAFETY.

"It is to be hoped the good sense of the lines will prevent any general increase in their speed, at least to any extent; but trains have been run during the past year on the Denver and Rio Grande Railroad at 30 and even 40 miles per hour, and it is impossible to see why they can not, if it becomes necessary, increase their present rates as readily as on the wide gauge.

"As regards safety, the cars are no more likely to upset than on the wide gauge, because the centre of gravity has been greatly lowered. This is confirmed by the year's experience on the road. A car on the wide-gauge road, it is true, can be made considerably wider than it commonly is without this danger, but that would require a broader and costlier road, and in the practical transaction of the carrying trade, the unit of the gross business, the car-load, has proven to be already too large. It wants to be reduced rather than be enlarged. There is one respect in which the narrow-gauge car is undoubtedly safer to travel in than the wide gauge—that is, in the reduction of the momentum, which is the measure of the difficulty of stopping its headway in case of danger, as well as the concussion in case of collision or being thrown from the track. To carry 100 passengers on a narrow-gauge road, the weight of the cars alone would be 18 tons, instead of about 36 tons, as on the broad-gauge, consequently the momentum at the same speed would be but little over one half.

"A positive advantage is claimed from the reduction of the carrying capacity of a car below what it now is on wide-gauge roads. It so frequently has to go partially loaded in the practical, everyday working of the business that it would be better if it were smaller. It is well known how rarely a passenger-car is full; although capable of seating 56, the cars probably do not average in the United States over 25 passengers to the car. In the heavy Pullman car it is but 15. It is the same with freight to some extent. The railroads in the United States carry at least four times as much total weight yearly as of freight load. If the car unit were smaller, much unnecessary hauling would be saved. For local trade especially, which constitutes the bulk of business on almost every American railroad, a great advantage would be gained, saving time, side-track room, besides dead weight. The capacity of the narrow-gauge car even exceeds the average actual load of the broad-gauge car."

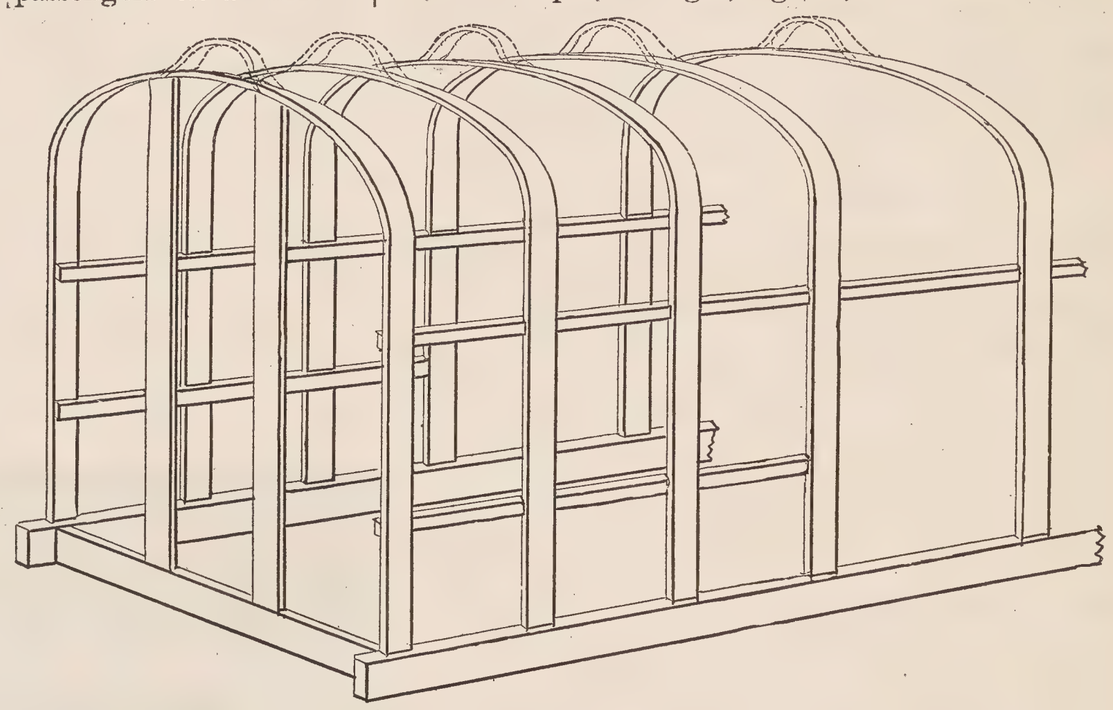
Waste of Power.

THE power needed and the power consumed in wood-shops are two quite different things. The old saying that time is money, is equally and more obviously true if rendered, power is money. It is an element of cost, just like oil, tools, or lumber. Power is, however, a less tangible thing, and because it is not seen and handled, is too often allowed to waste and escape under the notice of those who are rigidly careful in other matters. How common it is in going into a shop to hear the belts screeching on the pulleys, belts running half on the tight pulley when it is standing, or sometimes a machine blocked to keep it from starting, with the belts dragging on the pulleys. All this means waste of coal and waste of money, not by loss of power alone, but by the destruction of belts. If a belt is allowed to rub on a tight pulley, or any other fixed object, it is at once heated and stretched, and as it stretches on one side, the tendency is to draw it more on to this object; if on the edges of tight pulleys, which is most common, its driving power is impaired to the extent that it is rubbed or stretched on its edges, as no contact takes place when it is shifted. Whenever a heated bearing is suspected, the rule is to hunt it up at once and correct it; the same thing should be done with the screeching of belts—whenever heard, look it out, and change the shafting until it runs true. A belt always runs to the nearest end of a shaft, which is just the opposite way from what is generally supposed. The old theory that a belt always runs to the highest part may be true, and is undoubtedly true with reference to the convexity of the face of pulleys, but does not apply to pulleys that are set diagonally to the line of the belt.—*Cabinet-Maker.*

THE Huntingdon Car-Works, at Huntingdon, Pa., of which Orbison, Welch & Co. are the proprietors, have a capacity of six freight-cars per day.

Improved Car-Frame.

THE engraving illustrates an improved method of car-framing invented by W. G. Von Staden, of Toronto, Canada. The improvement consists in making the side-posts and rafters of one continuous piece of timber, steamed and bent to the required shape, as shown in the cut. It is claimed by the inventor, that the body-framing of a car constructed in this manner is cheaper, stronger, lighter, and more durable



than the ordinary method of framing, and that it is less liable to splinter or break in case of collision. The fibre of the wood follows the curve of the roof, and the rafters will sustain a greater external weight or a heavier blow than if sawed in the usual way, while they are at the same time less liable to split or fracture. The dotted curves at the apex of the roof represent supplemental bends, which can be made in the same single piece of wood, when required for the dome of passenger-cars. Almost any style of bracing can be used, and the ribs can be applied for renewals as well as for new cars. The belt-rail can be put in in the usual manner. The plate may either be made of intermediate pieces between the posts, secured by longitudinal rods, or it may consist of one piece extending the whole length of the car, gained out and finished flush with studs outside, and firmly secured to same. The outside sheeting is nailed to the plate; the roof-boards run longitudinally, and are finished flush with the side sheeting. The cornice is planted on the face of the sheeting, and leveled on the edge, and of sufficient thickness to carry the water over the doors. The roof and upper edge of cornice can be covered with canvas, tin, or iron, and should be well painted. Further information may be had by addressing the patentee, as above, P. O. Box 23, Toronto, Ontario.

The New International Bridge.

THE great international railway bridge, to span the Niagara River between Buffalo and Fort Erie, will, when completed, be one of the triumphs of the age in the way of engineering skill and the beneficial results insured. This bridge is the enterprise of an independent company. The cost will be something over one million of dollars. The work was first commenced in May, 1870.

The Buffalo *Commercial* gives a description of the work:

The superstructure is of iron, supported on stone piers, with the necessary "draws" for the passage of vessels. The length of the main bridge across the river, is 1968 feet; thence across Squaw Island to the west end of the bridge over the Black Rock Harbor, is about 1200 feet; and the bridge over the Harbor to Niagara street, is 517 feet. Squaw Island is at present crossed by trestle-work some twenty feet in height; but this is to be filled up, so that the track across the island will be upon a solid embankment. The work of filling will not be done until the completion of the bridge, however, as the material is to be brought from Canada.

Commencing at the Canada shore, there will be nine

spans across the river proper; three of them are 190 feet each in the clear; then come three spans, each 240 feet in the clear; then two "draw" openings, each 160 feet; then one span of 130 feet to Squaw Island.

The length of the bridge across Black Rock Harbor, as before stated, is 517 feet, and in this will also be two openings of 90 feet each, with a pier between. The "swing" over this opening, as well as that over the opening in the river, will be operated by steam, and the length of time required to open or shut the same is given at fifty seconds. The depth of the water in the river where the bridge crosses is from ten to forty-three feet.

A novel plan is pursued in placing the iron spans upon the piers. They are built upon a frame-work over a number of pontoons which act in the manner of a dry dock. The pontoons are carefully dropped between the piers, and when in position, water is let into them, and the iron truss is settled into its exact place on the piers.

The Grand Trunk, Great Western, and Canada Southern railways have already put down approaches on this side, which is about one hundred feet south of Parish street, and here, also, several of the roads have already put down tracks, including the contemplated New-York, West Shore, and Chicago road. It is now expected that the bridge will be completed, and a formal opening take place, some time during the month of October.

Oxford Co-operative Car-Company.

THIS company consists of about fifty experienced working mechan cs, who have combined together in the coöperative plan to manufacture cars at Oxford, Chester Co., Pa. All the men are experienced mechanics; one of them was foreman in the Jackson & Sharp Company's shops; another filled a similar position in the shops of the Philadelphia, Wilmington, and Baltimore Railroad. They intend to build all classes of cars, from the smallest hand-car to the most elaborate "palace." The erecting and machine-shops are completed, and the other shops are in progress. Each mechanic will contribute ten dollars per month to the capital of the company, which amount will be de ducted from his wages. The town of Oxford has also loaned $50,000 for five years, to the enterprise. They are making every preparation for doing the very best kind of work, and so large a proportion of the men being skilled mechanics and individually interested in the success of the establishment, the cars built by them should be equal to the best built elsewhere. They are making preparations to supply the men with the latest and best information which is accessible. Many persons interested in the system of coöperative labor will watch this project with much interest, and a al t e social phenomena of modern times seem to point to coöperation as the solution of the present disturbed relation of capital to labor, the success of the Oxford Company's scheme would be an important step gained in this system of uniting the two.

Iron and Wood Bolster.

THE drawings illustrate a combined iron and wood bolster, and also a diagonal brace, used at Wilmington, and perhaps elsewhere, in the construction of passenger-cars. Fig. 1 is a side-view of a portion of the floor frame, with the side-sill broken away to show the position of the brace. Fig. 2 is a side-view of the bolster showing the cross truss-rods and sections of brace and longitudinal timbers. The bolster consists of three pieces of oak, with two intermediate pieces of iron

FIG. 1.

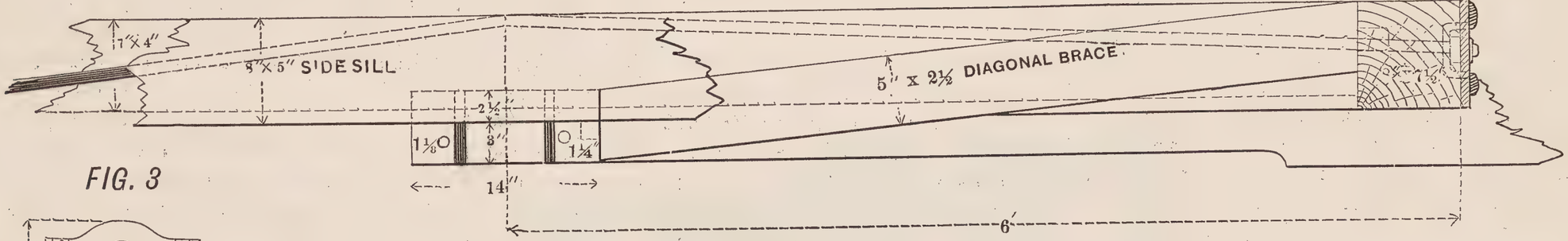


FIG. 3

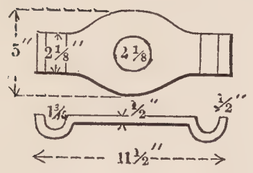
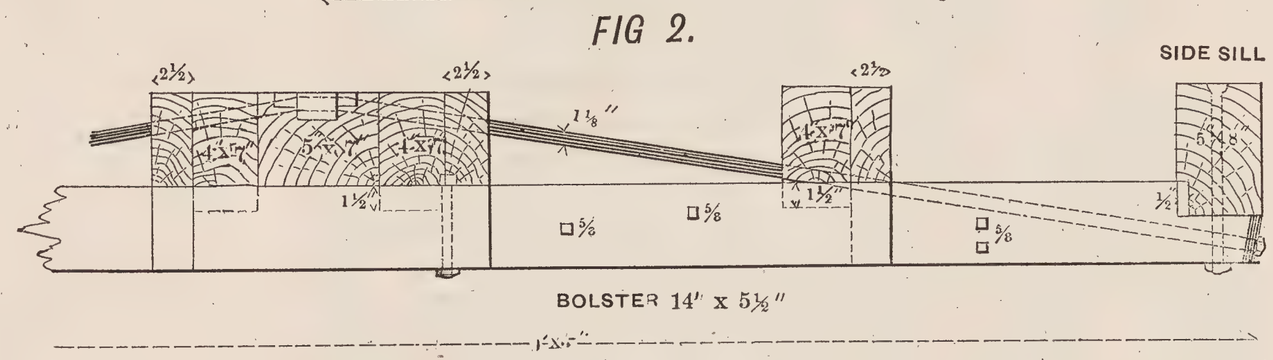


FIG 2.



¾ of an inch in thickness, all of which are firmly bolted together, the entire width of the compound bolster being 14 inches, and the thickness 5½ inches. Although not so highly esteemed in some respects as the iron bolster of the standard pattern, it has nevertheless some advantages. It requires less blacksmith work, and can be made, so far as the iron is concerned, by merely cutting a bar the proper length, and drilling suitable holes. It is a little heavier, and costs less than one entirely of iron. The center-sills and string-pieces are notched on to the bolster; the side-sills are also notched half an inch on the end, as shown in Fig. 2. A plate of cast-iron about an inch thick, covers the end of the bolster below the sill, and serves as a washer for the two 1⅛-inch truss-rods that are used. On the top of the bolster between the centre-sills, is placed an oak block which carries a wrought-iron saddle-piece, of the form shown in Fig. 3. This saddle prevents the truss-rods from working down into the wood as they would otherwise be likely to do, and it also provides a broad and firm bearing. The saddle has two pockets, as shown in the cut, to receive the rods. The side-sill is secured to the bolster by two ⅝ bolts.

The diagonal brace is of Southern pine, 5 x 2½ inches, and extends from the bolster to the upper part of the end-sill, as shown in Fig. 1—two or four being used, as occasion may require. They add materially to the strength and solidity of the end of the car, and in case of collision, they greatly augment the resisting power of the end-sill by transferring a portion of the strain to the bolster. The draw-beams or platform timbers are of the usual pattern. On many cars, these timbers extend back of the bolsters, but this can only be done when open iron ones are used. The car to which this compound wood and iron bolster was attached, is 9 ft. 7 in. wide. From centre of bolster to outside of end-sill, is 6 feet, the sill being of oak and very stout. Counter-sunk washers hold the nuts on the ends of the long truss-rods, as shown in Fig. 1. When the panels go on, these nuts are flush with the outside, but perfectly accessible with the use of a box-key. As most of the dimensions are given, and the drawings made to scale, no difficulty will be found in understanding the construction.

THE shops of the Schenectady Locomotive Works are to be increased by the addition of a building 400 by 80 feet. About 300 feet of this is to be an addition to the blacksmith-shop, the remaining 100 feet being for a new machine-shop.

Drying Paints and Varnishes.

THE term "drying," as applied to the solidification of paints and varnishes, is improper, as it signifies that a body moistened by a liquid loses that liquid by evaporation. Although spirits of turpentine that is generally used to diminish the viscidity of the oil in paints, and to enable the mixture to flow better—although this turpentine evaporates—there is left a fluid coat, thicker than before, but by no means dry, being in condition called "set," and from this point in the hardening process, far from losing any thing by evaporation, the coat hardens by absorbing oxygen from the air. A panel of wood, painted or varnished, dries more quickly in a jar of oxygen than in the air, and does not dry at all in a jar filled with carbonic acid gas. A freshly painted surface may be for a long time under water without drying, not because it is like cloth, but because the water keeps it from the oxygen of the air. Other things being equal, paint and varnish dry more quickly at a temperature of eighty degrees than below. This explains why in practice the proportions of the dryer should vary in summer and winter, in mixing paints for outside work, and it shows also why paint-shops should always be kept at a summer temperature. A coat of ordinary white-lead absorbs in drying about three per cent of its weight of oxygen. The time required for this absorption, when no drier is used, depends upon the nature of the pigment used. Thus while white-lead mixed with raw oil, in a certain series of experiments, became dry in three days, zinc white required seven days, antimony white fourteen days, and the arsenicate of tin, also a white pigment, was quite fresh after an interval of two months. It will be seen that the latter substance acted as an anti-siccative, and prevented the oil from oxidizing.

THE new depot of the New-York Central and Hudson River Railroad, at Albany, is about completed, and only the finishing touches are wanted to make it one of the handsomest structures in the city. The principal rooms are finished in oak and walnut, and the iron supporting pillars painted in black and gold. At the north end is a spacious dining-saloon. A wide platform intervenes between the east front and the tracks, but it would appear that there is to be no shed or covering over it, which, in the event of rainy weather, will be decidedly unpleasant; for the distance from the depot to the tracks being so considerable, the ladies will suffer, and many a fine bonnet will be sprinkled.

THE Philadelphia and Reading Railroad Company are erecting an immense ship-yard, which, when completed, will be the largest concern of the kind in the country. The building is 120 feet wide, and 497 feet long. The blacksmith-shop is 153 feet long by 53½ wide. The pattern-shop is 40 feet by 60 feet. A wharf 400 feet long is being built. The company will build all its steam colliers and other vessels used in the coal traffic.

The Axle Question.

EDITOR OF THE NATIONAL CAR-BUILDER:

DEAR SIR: I have read in your valuable paper several articles upon what is called the standard axle adopted by the Master Car-Builders' Association at their last annual meeting, the dimensions of such axle being 6 feet 10 inches between collars, 5 inches diameter at the wheel-seat, and 4½ inches at the centre—these diameters being those of the unfinished or forged size. In regard to the utility of such an axle, I have hitherto refrained from any public expression of my views, as I wished to see to what extent such an addition to the dead weight of our railway rolling-stock is likely to be recognized and approved by railway managers. My impression is, that very few, if any, of those who favor so large an axle, have made any reliable estimate of the additional expense which would attend its adoption; and as this is an important point to be considered in deciding upon its advantages, I beg to submit to your readers the following suggestions in regard to the expediency and economy of adopting the axle recommended, as a standard in the future construction of rolling-stock.

An axle of the dimensions above named, would weigh from 400 to 410 pounds as it comes from the forge; while one of the same length between collars, with a forged diameter of 4⅜ inches at the wheel-seat, and 3⅞ inches at the centre, will weigh 100 pounds less. The 4⅜ diameter will fit 4 5/16 for the wheel, give journals 7 x 3½, shoulders 4¼, and collars a trifle smaller. By reducing the axle one sixteenth between the shoulder and the face of wheel-hub, the wheels can be pressed on with greater facility. Unless our cars are to be made much heavier than they are now, which I think is not likely to be the case within the next ten years, an axle weighing from 300 to 310 pounds, is in my judgment amply sufficient. A broken axle caused from overloading, is a thing of very rare occurrence, although journals sometimes burn and are twisted off from this cause. Let any master-mechanic or car-builder who keeps a record of broken axles, look it over for the last ten years, and see if such breakages have not been fewer within the last five years than within the five years preceding. I confidently assume that such will be the result. How is it accounted for? I answer, not by very much increasing the diameter of the axles—for nearly all roads used as large axles ten years ago as they do now—but by the common law of cause and effect; that is to say, when a break occurs, it is owing to some defect aside from small or light dimensions. When such a thing happens, the axle is carefully examined, and there is invariably found some defect in material or manufacture, in the fitting of the axle to the wheel, or by an abrupt shoulder. The master-mechanic or master car-builder, in order to prevent a similar accident in future, does not add ⅛ of an inch more to the diameter, but leaves the axles nearly their forged size, discards the shoulder, and uses his best endeavors to get perfect axles. And here let me say that among the many good things already accomplished, and being accomplished, by the Master Car-Builders' Association, is the discarding of the square shoulders on axles, a result which was brought about by their agency.

In the spring of 1867, the writer put under the passenger equipment of the road with which he was then connected, sixteen steel axles, 6 feet 6½ inches long, over all, 3⅞ inches diameter at the wheel, and 3½ at the middle, each weighing 240 pounds. These axles ran under coaches and baggage-cars three years, and were then put under the freight equipment. Now, why should a railroad company haul so much dead weight over its track in the shape of axles, when a lighter article, made of better material, will answer as well, and so far as non-paying weight is concerned, a good deal better?

To convey an idea of the additional cost which will necessarily attend the adoption of the axle recommended by the Car-Builders' Association, I would invite attention to the following estimate, based on the difference of 100 pounds in weight, as shown above, between the so-called standard size, with its forged diameter of 5 inches at the wheel-seat, and an axle 4⅜ inches, forged diameter, at the same point.

Additional weight per car, 400 lbs. @ 5c.	$20 00
Additional weight of Hubs and Boxes, 100 lbs. @ 4c.	4 00
Additional cost per car	$24 00
1000 cars, at $24 each, would be	$24,000 00
Interest, 5 years, at 7 per cent	8,400 00
Cost of hauling additional weight of 500,000 lbs., or 250 tons, at 1¼c. per ton per mile, allowing each car to run 75 miles per day, 300 days per year, for 5 years	350,000 00
	$382,400 00

According to these figures, which I believe are approximately correct, the additional cost of running the standard axle under 1000 cars for 5 years, would be $382,400, or $76,485 for each year. It is a small road that does not own a thousand cars; and several railway companies will add two thousand cars to their rolling-stock during the present year. * *

Improved Car-Seat.

THE cuts represent an improvement in the construction of railway car-seats, patented by John F. C. Hollings, of Detroit. The design of the inventor is to secure greater elasticity to the seat, as well as economy in cost, and durability in the wear. This is accomplished by a peculiar arrangement of the springs, and the employment, in connection with them, of a cane rod, or its equivalent, to form an edge for the cushion, and thus distribute the pressure equally on all the springs, and relieve the central part of each individual spring.

Fig. 1 is a perspective view of the seat, showing

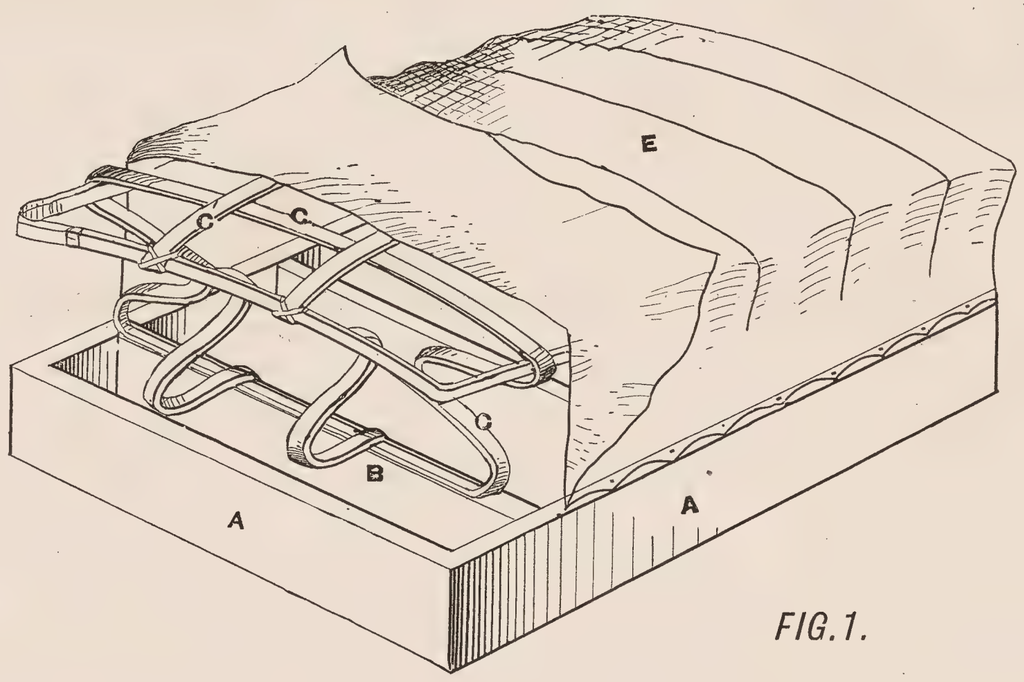


FIG. 1.

its interior construction. A represents the frame, into the sides of which are mortised a series of cross-bars B. To each of these, a steel spring C, as shown in sectional drawing, Fig. 2, is secured by staples or screws *a*. Other springs of similar design, run lengthwise the seat, crossing the others at right angles, and

FIG. 2.

fastened to the bars nearest the ends of the frame. These are represented in the cut by C^1. An edge-frame D, consisting of a single rod of rattan or similar material, is placed in the bottom of the curve formed at the top corners of all the springs, and fastened with twine. The whole is then covered with burlaps E, or other stout fabric, on which a thin layer of hair or tow is laid, when it is ready for the outer covering of plush. The reëntering curves of the springs take and sustain the weight of the sitter, and afford a strong but elastic support, while the upper and longer part, being very flexible, yields to his contour and forms a most agreeable and comfortable seat. If preferred, the rattan rod may be lashed to the outer upper corners of the springs; but in either case it should be wrapped with burlaps coiled round it and stitched fast. When the burlaps covering is put on over the whole, it is also stitched to the rod, so that the latter will be so strongly fastened that it can not get out of place.

This improvement is also adapted to sofas, couches, and chairs, and costs much less than the ordinary style of upholstered seats. Further information may be obtained by addressing the patentee as above, care of Pullman Palace-Car Company, Detroit, Mich.

Car Service.

A CORRESPONDENT of the St. Louis *Progression* writes as follows on the subject of freight-car service, and the methods of charging for the same:

"The question as to how to improve on the present method of paying for foreign car service, is now being discussed by our leading railroad men; some are of the opinion that it would be a better plan to charge by the day, while others think the old method of charging by the mile preferable. Charging by the day would have a tendency to push the cars through and return them sooner than by the mileage plan, as it would be to the advantage of all roads over which the car should pass, to get rid of it as soon as possible in order to save rental.

"Should this method be adopted, it would be necessary to tag each car when billed, giving destination, route, etc., with request to return by the same route. It would also be necessary for roads to make a monthly report giving number of each car and number of days for each; this being done, the time could be checked at the main office; whereas, under the present mileage system, we have to accept the report of roads over which our cars pass, without being able to check them. It is true that it will take more clerical work to operate the day system, but the result will doubly pay for the additional force. There are two objections, however, to this method; first, in case of a blockade, or any prospects of one, the adjoining road would be afraid to receive cars, knowing that, as soon as they have receipted for them, they become liable for the rent. Whereas, in the mileage system, they would have to pay for only so many miles any way, and would willingly receive the cars and endeavor to put them through: there could be a rule, however, to govern this. Another objection would be in case the cars are returned by another route, the roads hauling them would receive nothing (if empty) for the haul, and would be required to pay rent in addition to that. Railroads have lost so largely since the adoption of the uniform gauge, by letting their rolling stock get from home, that it is a matter of vast importance to all interested in railroads to make a change of some kind, and the sooner it is done the better it will be for the stock and bondholders."

THE new shops of the Allegheny Car and Transportation Company, at Swissvale, on the Pennsylvania Railroad, are rapidly approaching completion, and it is expected they will be in operation early this month. The machinery and tools are all in readiness to be placed in the buildings.

THE Texas and Pacific Railroad Company now have 244 miles of their road in operation, and expect to have 180 miles more in operation before the close of the year.

Improved Track-Cleaner.

THE occasional severity of our northern winters and the heavy snow-storms incident to the climate, causing serious obstruction and delay on our numerous lines of railway, have rendered necessary some device that will effectively and expeditiously remove the snow from the track. Various plans have been tried, but none of them have thus far fully met the requirements of the case. They have, for the most part, been constructed on the wedge principle, with a mould-board similar to that of an agricultural plow, and designed to clear the track by throwing the snow off upon either side; but in practice they have not prevented the snow from getting under the wheels in sufficient quantity to stall the engine and prevent rapid progress. The plow built by Mr. Stevens for the Union Pacific road, is similar to previous devices, but very much larger and stronger, being 42 feet in length, with a floor of heavy timbers, its front a solid mass of timber with a cutting edge of iron some six inches wide. This ponderous mass, reaching as high as an ordinary engine-chimney, is carried on double trucks with axles of great strength, far exceeding the dimensions of the recently adopted "standard" axle. Two or three engines are required to drive it, and yet it does not do its work effectively, except in a comparatively open country. The New-York and Oswego Midland road has six plows of a similar kind, but not so heavy.

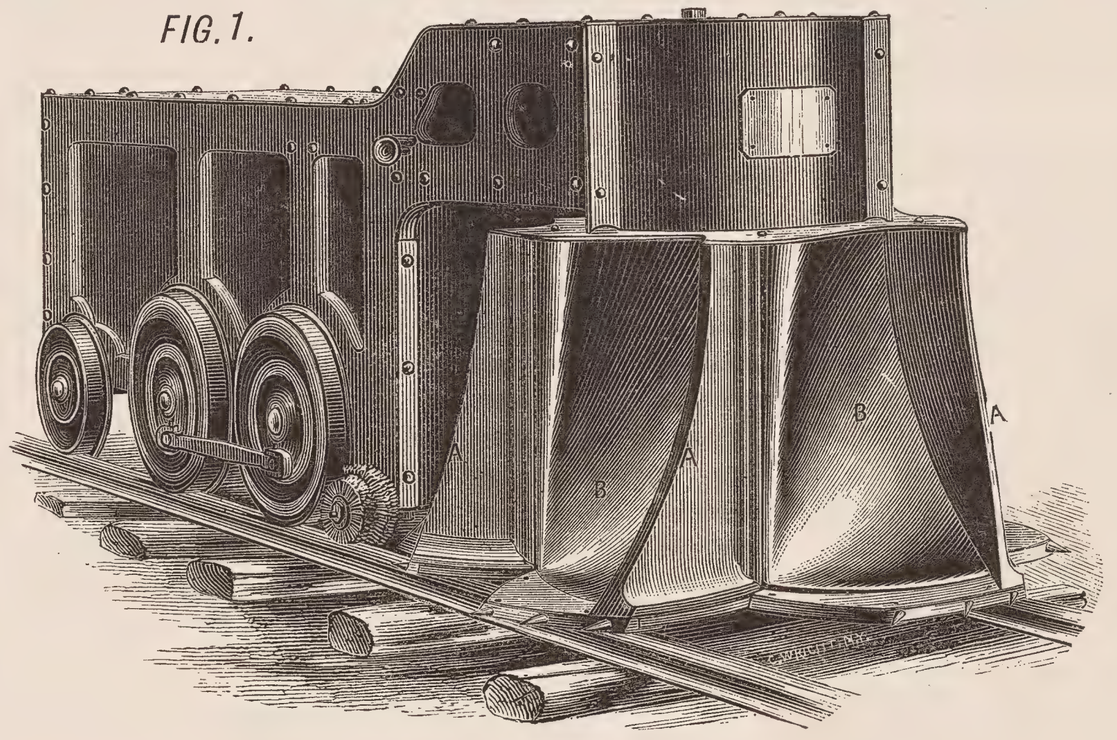
The inherent defect of all plows constructed on the wedge principle would seem to be, that when they enter a drift, the resistance increases rapidly, while the power, which should also increase in the same ratio, is diminished by the reduction in speed, and is altogether lost if the snow is so deep as to ride over the plow or fall from the sides of the track upon the rails, destroying the adhesion of the wheels when it is most needed. It is as troublesome in such cases to get out of the drift as to get through it.

The device illustrated by the engravings is more properly a snow-shovel, one of its peculiar features being its capacity to work slowly through a drift, demolishing it as it moves along. Another peculiarity consists in the power which removes the snow being independent of the propelling power.

Fig. 1 is a perspective view of a large model constructed to show the working of the machine upon a track covered with sand or sawdust. The part which acts directly upon the snow is the cutting-head, which receives a rapid rotary motion, and consists of a base of iron or steel furnished with a sharp edge, and also with teeth for cutting ice. Above this bottom-plate or base, are the cutters A A A, with sharp edges which are sloped inward as they approach the top, as shown in section, Fig. 2. These cutters in rapid revolution cut their way into a drift, but not being placed radially, they would not throw the snow outwardly very much; but if they were so placed, would throw it outward in all directions. In order to throw the snow backward or upon one side, the wings B B are pivoted on their left-hand edges, while the right-hand ones are left free to swing in or out. The head revolves in the direction to which the teeth point, the wings revolving with the cutting edges, and as they approach the front and right-hand side of the machine, as seen in Fig. 1, they receive a sharp forward motion toward the right, throwing the snow upward and outward with great force, the upward motion being caused by the flare of the wings at the bottom, the wings, as they pass around, projecting a little distance beyond the cutter. The outward motion is given by means of eccentrics on the post which supports the head. The cutter-head is patterned like a circular saw with three or five teeth, and with suitable wings fitted between the teeth for throwing the snow with which it comes in contact, at the proper moment. Each wing as it passes behind the head, is withdrawn by the same machinery that throws it out. The head being driven independently of the machine upon the track, almost any desired velocity may be obtained, and the snow thrown a corresponding distance, even when the machine is standing in a drift.

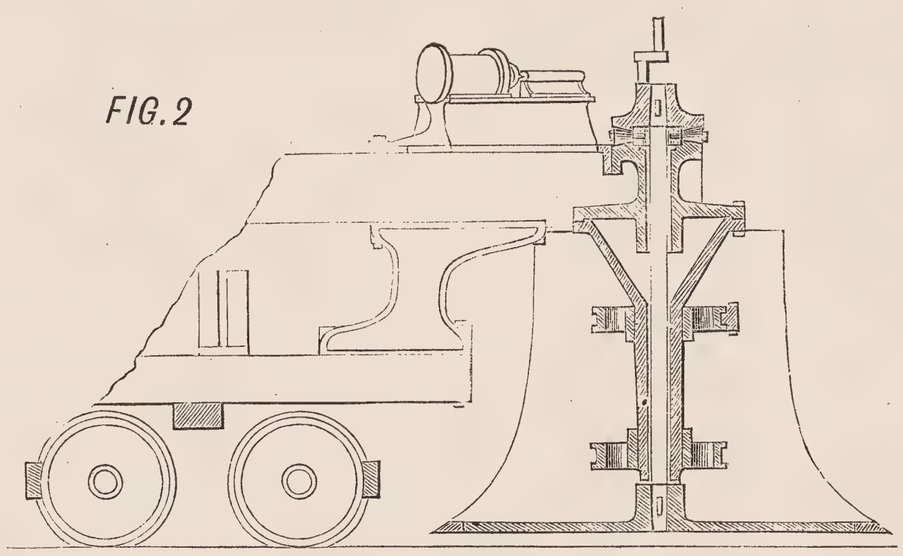
In a heavy drift or road-cutting which has been opened up once or twice, and there is no place to throw the snow which has again filled it, this machine is very serviceable. By a proper arrangement of the eccentrics or gear-wheel, within the cutter-head, the snow will be thrown backward the whole length of the machine, and landed upon a car, which may be taken away and dumped as fast as loaded. The drivers are, of course, protected by a hood, and movable aprons may be used to give the snow a proper direction backward. In this respect, the machine does the work of a gang of men with shovels, but much more rapidly and effectively. It also will run through a light drift a great deal faster than ordinary plows.

FIG. 1.



The cutter-head is worked by a pair of horizontal engines, as shown in Fig. 2, where the position of the cylinders, cranks, etc., is indicated, as well as the arrangement of the interior of the head. The power is furnished by an ordinary locomotive boiler placed farther back upon the frame, and balancing the weight at the forward end. The power for propelling

FIG. 2



the machine upon the track is also furnished by the same boiler, but is applied by means of separate cylinders underneath, and is independent of the working of the cutter-head. The cutter-head is carried upon suitable friction-rollers, and can be used singly or in pairs placed side by side, or one above the other, according to the nature of the work to be performed, and depending upon the depth of the snow. A large model is in operation in this city, and is the invention of Signor Abbiati. Any farther information may be obtained by addressing J. C. Fryer, Room 124, Trinity Building, 111 Broadway.

THE machine-shops of the Missouri, Kansas, and Texas Railroad, now located at Junction City, Kan., will be removed to Dennison, Texas, this fall. Car repair shops are also to be built at Dennison.

The Ramapo Wheel and Foundry Company received the award of merit at the Vienna Exhibition for the superior excellence of their car-wheels.

New-York Central Quadruple Tracks.

THE work of laying the new tracks is making rapid progress. The company has bought 60,000 tons of English steel rails, which are now being delivered. None but steel rails are to be used in any part of the work. As it requires from 2500 to 3000 ties per mile, full 2,000,000 ties will be used for the whole, including the sidings. About 70 miles are already graded and ready to lay the track. It is expected that 250 miles will be graded this fall, and that the whole will be completed in two years.

It is designed that the two north tracks shall be used for passenger trains and the two south tracks for freight. In laying the new track, the effort is made to straighten out the line as far as possible and take out the curves, and, with this view, the new tracks are not placed throughout on the same side of the old, but adjusted so as best to accomplish this end. At West-Albany, under the new arrangement, the passenger tracks will not follow the present line among the shops and cattle-yards, but will run some distance south of the shops. At Buffalo, Rochester, and Syracuse, there will be large yards covering 60 acres with 30 miles of tracks at each place, for the accumulation of cars ready for any emergency. This arrangement is already nearly completed at Buffalo and Rochester. The total cost is estimated at from $15,000,000 to $20,000,000.

THE New-York and Oswego Midland Railroad repair-shops for the Eastern and Middle Divisions, are to be located at Middletown, N. Y., and their construction will be commenced immediately. The plans and specifications have been made by Mr. W. H. Griggs, the master-mechanic. There will be about a dozen buildings in all. The round-house will be 286 feet in diameter, and contain 40 stalls. The wood-shop for building and repairing cars, is 90 x 150 feet and one story high. The machine-shop proper, for erecting and repairing engines, is 90 x 200 feet, and will have ten pits for locomotives. In front of this is the transfer-table, by means of which engines are set into the pits. It is 35 x 165 feet. In the rear of the wood and machine-shops is the blacksmith-shop, which is 50 x 115 feet, and will contain a large number of forges. In front of them is the store-house for supplies, which is 50 x 70 feet, and two stories high. The car-house is 316 feet in diameter, and is divided into 40 stalls, with a turn-table in the centre for distributing the cars. The other buildings are: a brass foundry, 32 x 50 feet; a boiler-shop, 50 x 70 feet; a house for the boiler and engine that are to furnish steam and power for the entire works, each to be 25 x 25 feet; and the coal-sheds, 40 x 200 feet. All the buildings are to be of wood, and roofed with tin. Those that are exposed to danger from fire will be lined with brick to the height of five feet.

PORTER, BELL & CO., of Pittsburg, builders of light locomotives, have shipped to the government of Ecuador, South-America, another beautiful narrow-gauge locomotive, built expressly for ascending the lofty mountains of that country. This is the second locomotive of this class which the above firm has built for the same government.

The National Car-Builder,

PUBLISHED MONTHLY,

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JAMES GILLET, EDITOR.

Terms, One Dollar per Annum.

OCTOBER, 1873.

Editorial Announcements.

CORRESPONDENCE.—*We cordially invite the coöperation of the railroad public in affording us the material for a good mechanical paper. Articles relating to rolling-stock and machinery, by those practically acquainted with those subjects, will be gratefully received. All communications must be addressed to Vose, Dinsmore & Co., No. 32 Warren Street.*

ADVERTISING RATES.—*For one square, or one fifth of a column, $5 per month, or $50 a year. For half a square, $3 per month, or $25 a year. Larger advertisements by special contract.*

All communications in regard to advertising should be addressed to L. F. DINSMORE, *Post-Office Box* 4055, *New-York City, who is our agent for advertising, and authorized to make contracts, collections, etc.*

ENGRAVINGS AND ILLUSTRATIONS.

We would invite the attention of Master Car-Builders and others to the advantages to be derived from publishing in THE NATIONAL CAR-BUILDER *engravings designed to illustrate the various features and details of car construction, and especially such improvements as can not otherwise be clearly presented. We will procure cuts to be made in the best manner from drawings or models that may be sent us, and charge only for the cost of engraving, inserting the same in our paper with suitable descriptive details, without charge.*

The Consumption of Timber.

THE rapidity with which the valuable timber forests of the country are being swept away to supply the constantly increasing demand for lumber, points to a time, not very remote, when there will hardly be wood enough left for the ordinary necessities of life. The prospect of a timber famine in a land covered with such magnificent forests as ours was half a century ago, may well awaken attention. The millions of dwellings and other structures, farm-fences, shipping, railroad-ties, telegraph-poles, wheel vehicles, furniture, implements, machinery, railway rolling-stock and numerous other things for which wood is used, are all perishable, and need to be replaced at longer or shorter intervals of time. To this enormous consumption must be added the item of fuel for railroad, domestic, and manufacturing purposes, and also the export demand, which can not fail to increase every year, as the value and variety of our native woods become known abroad. We already supply the European and Australian markets with timber for many purposes, especially for carriage-building and cabinet work; and heavy contracts have been made during the past year for future delivery. The ties for Peruvian railroads are all shipped from Oregon, and the rolling-stock is supplied by the car manufactories of the Eastern States. The walnut timber of the West, once so abundant as to be used for farm-fencing and fuel, is being swept away at a rate which but few of us adequately realize. The trees are bought standing by the thousand, at prices far below their actual value, and in some localities with little or no transportation facilities, they are still regarded as an incumbrance, and even burned to get them out of the way.

Our forests are stripped of the most desirable timber first, and it will not be many years before the supply of merchantable oak, ash, maple, whitewood, walnut, and pine will be sensibly diminished, and their price correspondingly increased. These varieties enter largely into car construction, to which they are specially adapted by their peculiar qualities, each being suited for some particular service of light or heavy framing or interior finish. Oak has hitherto been considered most valuable where strength and solidity are required, and the consumption of it has been greater in proportion to its abundance than that of some other kinds. A substitute for it will have to be found before many years, and we think it will be Southern pine, of which there are continuous forests from Virginia to the Gulf. The virgin or untapped trees of the Georgia or Florida growth, are exceedingly rich in resinous matter, and the timber when seasoned, resists decay much longer than oak, has great strength, and is less liable to break. The other kinds we have named are in active demand, and unless some measures are soon taken in the form of legislation to protect our forests, by the prevention of reckless waste, and also to provide for the planting of new trees, we shall be compelled to seek for other substitutes for existing timber which it may not be so easy to find. In this fast age it seems almost absurd to wait for timber to grow; but that we shall have to do it is more than likely. A great proportion of the kinds suitable for railway ties and for fuel, may be grown within a period ranging from twelve to twenty years, not to mention other varieties of comparatively rapid growth, suitable for manufacturing purposes. The sooner the question of our future timber supply is seriously considered, and some incipient steps taken to provide against the extinction of the valuable woods which have hitherto been the pride of our forests, the better will it be for the business prosperity of the land, and the well-being of its people, fifty years hence.

The Immense Grain Crop.

THE present grain crop of the West is said to excel both in quantity and quality any crop of previous years. This is especially true of wheat. The quality of other cereals, also, is likely to be above the average of former years. The aggregate yield will doubtless be larger, owing to the increased area under cultivation. As an index of this increased production, we may instance a small town in Iowa, which three years ago had to buy wheat for its then new population, and which now ships 500 car-loads of it to the Chicago market. The same may be said of numerous other towns in the same State. Dakota also, ships wheat eastward this season for the first time. An abundant grain crop is an indication of a heavy pork-packing business. Having harvested the crop, and dressed and packed the hogs, the question is, how to get this vast accumulation of products to the best market. If the pressure for transportation could be more equally distributed through the year, the problem of how to meet the wants of shippers would not be so difficult; but here is a demand which for the time being altogether exceeds the capacity of our railroads, to say nothing of ocean transportation, and the seaboard facilities for storage and handling. Nearly 2000 car-loads of wheat have arrived at Chicago in a single day during the past month, aside from corn, oats, rye, barley, and other products; and the receipts would, it is said, be much larger if the roads had cars enough to take what is offered. There is an eagerness on the part of producers to ship at the prevailing rates established by the Illinois railroad commissioners; and with few exceptions, there is less complaint than heretofore against the railroad companies on the score of freight charges.

Never before, it is said, has there been such a demand for cars. Great as is the aggregate of the freight rolling-stock of our roads, it would seem to be inadequate for the moving of western products at a season of the year when the vast surplus seeks a market abroad, and the market abroad is no less eager to absorb the surplus, or at least a very considerable portion of it. We are aware that most roads, as a matter of economy, are averse to having on their hands an excess of freight-cars of any class, to stand idle upon side-tracks half the year, in order to be ready to move the entire grain or hog crop whenever speculators succeed in cornering the market, or a sudden flare-up in prices takes place from any cause; but in view of the increase of the cereal and other products of the West which must obviously take place every year, it seems to us that more cars suited to this special service should be provided—that is, a larger number in proportion to the maximum demand upon them, than now exists—and that this can be done without any detriment to net earnings. The fertility and agricultural productiveness of the Great West are too great and too highly prized to be neglected and allowed to run to waste. An outlet must be provided in the way of cheap transportation, and it will be provided at no distant day, to the utmost extent that the nature of the case will permit.

The effect of the recent money panic upon the movement of the grain-crop is most unfortunate for the interests of producer, carrier, and consumer, and every day the dead-lock continues is fraught with mischief to the commercial prosperity of our great seaboard cities, and the general business of the country. The emergency calls for earnest effort on the part of the government and our leading commercial men, to relieve the present stringency in currency, so that shippers can negotiate their bills of exchange. A few millions of currency now will afford more relief than ten times as much a month hence.

Car-Builders' Monthly Meeting.

THE regular monthly meeting was held at the rooms of the Association, 113 Liberty street, on the evening of the 18th ult. There were present Messrs. V. D. Perry, A. Steinbach, W. E. Chamberlain, D. H. Baker, L. Garey, C. A. Smith, Joseph Jones, E. A. Olmstead, C. E. Garey, J. W. Trussel, A. Gleason, and others.

The meeting was called to order by Mr. V. D. Perry, the Vice-President of the Association, who stated that the subject for discussion was the heating and lighting of passenger-cars.

Mr. Andrew Van Horne and Mr. W. M. Hoes, representing the New-York Steam-Heater Company, being present, were invited to explain the operation of their steam-heater for railroad cars, whereupon the former gentleman stated that the apparatus was strictly a steam, and not a hot-water heater, that it had a pressure not exceeding two pounds to the square inch, with no liability to explode under any circumstances, and that a car could be heated with it in fifteen minutes, as had been demonstrated at the works of the company in this city, where it was in operation in a large room, and where car-builders and others were invited to inspect it. Mr. Van Horne also stated that arrangements had been made to have one of the heaters placed on a car of the Connecticut River Railroad, within the next ten days, at Springfield, when an opportunity would be afforded of thoroughly testing its capacity. Mr. Garey said that the members of the committee on heating and lighting would be notified, so they could be present and witness its operation. [An illustration and description of this heater will be found in the June number of THE CAR-BUILDER.]

Mr. C. Spear, of the firm of James Spear & Co., of Philadelphia, manufacturers of the well-known Spear stove, explained the merits of the different patterns and improvements of this stove, as adapted to the warming of passenger-cars. It had ceased to be an experiment, as it had already been introduced and was in successful operation on nearly all the railroads in the country. One road, which had ordered 500 of them last year, had this year ordered 800 more. Its safety had been demonstrated in the upsetting of cars, when the stove was held in its position by the bolts through the floor. It was also applicable to furnaces and ranges, and large numbers had been sold for that purpose.

Mr. C. F. Knowles, of the firm of Knowles & Brownell, of Boston, proprietors and manufacturers of Eaton's patent car stove, briefly explained its character

and construction. It is securely fastened to the floor, the doors and damper are locked, and it can not be displaced by collision. It is compact and easily regulated, economizes fuel, and as a wood-stove can not be excelled. The cold air is admitted from above and becomes heated as it passes through the draught-pipe, causing a slower combustion than cold air, while the large radiating surface throws off more heat. The stove is in use on a number of New-England roads.

Mr. Steinbach, of the Philadelphia and Reading road, said that his cars were warmed by the Wooten heater, which was placed underneath the car. There was no fire inside. The cost of this heater was about $200, but he thought Spear's anti-clinker stove would be a decided improvement upon it, if the fire could be kept outside the car.

The subject of lighting cars being next in order, Mr. N. O. Parks, 257 Front street, New-York, was invited to make some experiments testing the safety and illuminating qualities of Downer's Mineral Sperm Oil. Several lamps filled with it, and provided with the dual burner, gave a clear and brilliant light; and its safety was demonstrated to the satisfaction of all present by heating it to a temperature of 208°, when it instantly extinguished a blazing ball of cotton dipped into it. It will not ignite under 300° Fahrenheit, which renders it far safer than gas, or gasoline, or any inflammable oil. Its cost is about the same as that of kerosene, it is free from odor, never gums in the lamp, and is not liable to spontaneous combustion. Its illuminating power is equal to 14 standard candles.

Mr. Chamberlain, of the Boston and Albany road, indorsed its non-explosive and lighting qualities, which he had satisfactorily tested, and could see no difference in the light given by mineral sperm, and kerosene. The lamps must have attention and be well-trimmed.

Mr. W. C. Wells, of Montgomery, Ala., exhibited a miniature model of a non-heating, oil-saving journal-box, and explained its construction and operation. It is a decidedly novel and original device, its peculiarity consisting of two sleeves of malleable iron or other metal, being placed over the journal and upon which the bearing rests. One or both of these sleeves, or neither, turn with the journal as they are heated or cooled by the speed of the train, and this process modifies the friction and regulates the lubrication, keeping the former at a minimum, and economizing the latter. It has been in use on the Montgomery and Eufaula Railroad, with satisfactory results. Mr. Wells will send to the rooms of the Association an axle equipped with the journal-box complete, for the inspection of railroad men. A more particular description will be given of it hereafter.

Dr. B. J. LaMothe exhibited a model of an iron car designed for either freight or passengers. It is constructed of steel rods and iron pipes fastened together by peculiar cast or malleable iron attachments, the outside to be covered with sheet-iron and the inside lined with wood. The inventor has been advocating this method of construction for a number of years. For a more particular description, the reader is referred to THE CAR-BUILDER of April, 1872, which contains a report upon the merits of this car, made by Mr. M. N. Forney.

The chair announced that the subject for discussion at the next monthly meeting, (October 16th,) would be *Car Centre-Plates and Side-Bearings.*

The meeting then adjourned.

The Standard Oil-Box.

THE committee appointed by the Master Car-Builders' Association, at their meeting in Boston, to determine upon the pattern and dimensions of a standard oil-box for journals, held their first meeting on the 17th of July, at the rooms of the Association in this city, when Mr. Jones, of the New-York Central and Hudson River road, was authorized to prepare patterns and drawings of the same, to be submitted to the committee for final examination and approval. In pursuance of notice, the committee met at the West-Albany car-shops for this purpose, on the 3d of September. A number of railroad men and car-builders were present, including Messrs. F. Childs of the Great Western of Canada; Enos Varney, of the Fitchburg road; Leander Garey, of the New-York and Harlem; George R. Bentley, of the Norwich and Worcester; George Hackett, of the Central of New-Jersey; William Johnson and Joseph Jones of the New-York Central and Hudson River; and W. E. Chamberlain, F. W. Adams, and W. R. Slocum, of the Boston and Albany. After a careful examination of the patterns and drawings submitted by Mr. Jones, and a prolonged consultation with the other gentlemen present, the patterns and drawings were approved with some slight modifications, and lithographic impressions of the same were ordered to be procured for distribution among the car-builders and railroad shops of the country. As it is uncertain at this present writing, whether the drawings can be engraved in time for insertion in the present number of THE CAR-BUILDER, we add for the information of our readers, the following memoranda made by the committee, and to which the finished patterns will be made to conform:

Jaw-Brace under Jaw, bar 2½ by ⅝, laid flat.
Bolts securing same, ⅝ diameter, having 2 nuts.
Thickness of back part and front plate of Jaw, ⅝ in.
Average end-play of Brasses on Journal, ¼ in.
End-play of Brasses on seat, 3-16 in.
Curve on top of Brass, 3-32 in.
Side-play of top slide, ⅛ in.
Curve radius at shoulder and collar of Journal, ¼ in.
Chamfer of collar, ⅛ in. each way.
Clearance between box and jaw-front to back, ⅛ in.
Clearance between box and jaw across back, ⅛ in.
Box cover secured by ⅝ bolts, round heads.
Key of same, ½ by 3-16.
Space between face of hub and shoulder of Journal, 2¾ in.
Distance between centre of holes across box for iron truck, 8 in.
Distance between same, for California truck, 9¼ in.
Distance between lugs on California truck-box, 4⅛ in.

The boxes are to have four distinguishing numbers and letters, as follows:

No. 1. A. For Equalizers.
" 1. B. For Springs under Journal.
" 2. B. For Diamond Iron Truck, flat top.
" 3. B. For California truck, flat top.

The jaw is to be called No. 1 for wood truck, and No. 2 for iron truck, and to have suitable ornamental raised mouldings near its edge; also bosses under bolt-heads. Its weight is about 115 pounds; that of the box, about 80 pounds, exclusive of brass, which weighs 10 pounds. Arrangements will be made to have the iron patterns made in Albany, for the use of the various roads, thus securing uniformity in their size, which would not be the case if made at different foundries. The patterns will be marked "M. C. B. Standard, adopted June, 1873."

The delegation of railroad gentlemen above named, were, on their arrival at West-Albany, most cordially received by Mr. Jones, and others connected with the Central road, including Hon. Henry R. Pierson, one of the directors of the same. Before proceeding to the special business for which they had assembled, a brief tour was made through the mammoth shops, and sundry objects of interest inspected. Just before noon, and in accordance with previous arrangement, a signal was given, and all the workmen from the several departments, 1500 strong, assembled in the wood-working shop, where the visitors had taken their places on a temporary platform. A more significant or striking exhibition of the collective bone and sinew of our railway shops is not often seen. Their stalwart arms and grimy faces, as they stood massed together, indicated where the physical power resides by means of which such gigantic operations are carried on, and such great results produced as are displayed in our railway system as it exists to-day.

Mr. Pierson made a brief address, welcoming the visitors, and explaining to the men the nature of the business they had come to transact. He then remarked upon the value of inventions and the necessity of adopting all useful improvements in railway mechanism. He spoke of the relations between those who occupied the various positions in railway service, of the interdependence which necessarily existed between the higher and subordinate positions, and the burden of toil which devolved alike upon all in their several spheres of duty. The measure of true manhood was to do well whatever we set our hands to do, whether it was to run a bolt-machine or handle the capital of a great corporation like the New-York Central Railroad Company. The address was well-timed and pertinent to the occasion, and was warmly applauded.

Mr. Adams, on behalf of the visitors, made a brief address.

After concluding their business at West-Albany, the party proceeded by a special train to the city, and partook of an excellent dinner at the Stanwix, provided by their entertainers of the Central Railroad. During the repast, the mayor of the city entered the room, and welcomed the party to Albany in a brief and appropriate address which was responded to with cheers and bumpers. The party then separated, having spent the day with such agreeable blending of business and pleasure as to fairly obliterate any distinction between the two.

The Official Report.

THE official report of the proceedings of the Master Car-Builders' Association, at Boston, was issued about the middle of last month, and is now being distributed by the secretary. It is a handsome, well-printed volume of 176 pages, and contains, in addition to the regular proceedings of the June convention, the constitution of the association, complete list of members, and other matter interesting to car-builders.

In the list of committees for the current year, on page 152, we notice that the committee on Brakes has been left out. This was an oversight. By referring to page 145, it will be seen that the committee of last year was continued. It consists of R. S. Ramsey, of the Pennsylvania R.R., (chairman,) Joseph Jones, of the New-York Central and Hudson River, and Hugh Gray, of the Chicago and Northwestern. The elaborate and able report presented by this committee, will be found in its proper place in the proceedings; and as further improvements and modifications in power-brakes will doubtless be made before the next annual meeting of the association, it is very proper that the subject should be left in the hands of the gentlemen who have already given it so much attention.

Wheel-Seat Diameter of Standard Axle.

SOME of our readers are under the impression that the finished wheel-seat diameter of the standard axle adopted by the Master Car-Builders' Association, should be 4⅞ inches instead of 4⅞, as stated in the diagram published in our last number; but when it is borne in mind that the diameter of the collar, and also of the space between the journal and wheel-seat, is 4¾ inches, the necessity of an additional ⅛ for the wheel-seat is obvious, in order that the wheel may go over the collar and intervening space easily. This was very apparent to the committee in preparing the drawing, although it seems to have been overlooked by the convention, as appears by the report of the proceedings.

THE Pullman palace-car coaches are now running on 152 different lines of railroad; there are 700 of them in all, and 120 new ones have just been completed. Twelve millions of dollars have just been invested in the organization. Every car costs from $17,000 to $20,000, and one of them is running on the New-York and Erie broad gauge, which cost more than $50,000. About the 1st of September they will begin operations on one of the great English roads. A system is in progress under the extensive organization by which they will sell tickets in London, Paris, Berlin, or St. Petersburg, and contract to convey passengers to San Francisco or any other point in the United States, including not only ocean travel and the care of baggage, but also the commissariat of the traveller, so that he can either find his effects at his destination, or can stop off for several days and then resume his journey.

Railway Supplies.

THE purchase of the various articles included in the category of railroad supplies is an undertaking of no small responsibility, and requires the exercise of the best judgment and discrimination on the part of the purchaser, as well as an intimate acquaintance with the fluctuations of the market, and an accurate knowledge of every detail pertaining to the trade. The general classification includes light machinery, metals, tools, textile and rubber fabrics, special devices and implements, upholstery goods, paints, oils, and various other materials required for useful and ornamental purposes, embracing the products of domestic and foreign manufacture, and of rival inventors; so that in many cases it is not easy to determine the relative merits of the various articles as respects utility, cheapness, and special adaptation, except by experimental or practical test. The operating economy of a road may be very much improved by a judicious selection of supplies. Its earnings may be saved or squandered in the purchase of a lantern or window-fastener, as well as in the purchase of a costly and ponderous piece of machinery. The class of supplies to which we would specially refer, is what is included under the head of car-trimming and material. In this branch alone there is a wide range for selection, and it is a great assistance to the purchaser to have the stock well selected from which he buys; and this can only be done by dealers whose experience and knowledge of the wants of the trade enable them to offer the customer what has been approved by actual use and the intelligent judgment of practical railroad men; and in case a choice has to be made between different things designed for a like purpose, he can not go far astray. Without any undue partiality, we venture to say to all purchasers of this class of supplies, that they will find as desirable a stock at the establishment of Vose, Dinsmore & Co., as anywhere else in the country. Their long experience in the manufacture of railway car-springs, and the special attention they have necessarily given to the structure, equipment, and ornamentation of passenger rolling-stock, enables them, in the selection of trimming-material, to recruit their stock with whatever is most desirable in point of taste, utility, and economy, and best adapted to the latest and most progressive style of car construction and finish.

The American Railroad Manual.

IN our last issue we called attention to this new railroad manual, compiled and edited by Mr. Edward Vernon, and published by J. B. Lippincott & Co., of Philadelphia. What we then said was based on an inspection of the proof-sheets; but we have now the completed volume before us, and we can cheerfully bear testimony to its superior excellence, especially in the matter of typography, paper, and binding. It contains nearly 700 pages, and is beautifully printed in clear type on delicately tinted paper. No expense has been spared to render it, in its general appearance, an exceedingly attractive volume, rivaling in many respects, some of the ponderous gift-books of the holiday season. As as pecimen of American book-making, it reflects the highest credit upon both compiler and publishers. We can not, of course, from a mere hasty examination, speak definitely of its value as a manual of reference in regard to the manifold details of railway history, construction, and operation; but from the labor bestowed upon it by the compiler, and his intimate acquaintance with all the particulars of railway progress in this country, the volume will doubtless be found as complete and reliable as in the nature of the case we have a right to expect. Obstacles will always exist in the preparation of such a work, which will make it fall short of absolute perfection.

Aside from the statistical information, charter history, and changes and transformations of the various companies, a distinctive and attractive feature of the work, and one which will doubtless recommend it to the general public, is the series of well-executed maps of States and groups of States, embracing all the railroads of the country, with their lines distinctly traced, and their names legibly printed, so as to relieve the reader from the task of puzzling them out from obscure initials. A general map is also contained in a pocket at the end of the volume, and detached from it so it can be taken out and examined separately. This map illustrates very clearly the geography and railroads of the Dominion and the Great West, and also a portion of Mexico. There is, also, as we stated in our previous notice, a very full and complete directory of railroad officers, classified into executive, transportation and mechanical departments. Its usefulness for reference, can not fail of being appreciated in spite of the many changes which are constantly taking place in the *personnel* of these departments.

The pages of the manual measure 10½ by 7½ inches, including margin.

Paneling.

THE strength, lightness, and durability of the passenger-car body are dependent in no small degree on the paneling, and the method employed in putting it on. No timber is so well adapted to the purpose as whitewood, on account of its lightness and peculiar fibre. Some builders use paneling ⅝ of an inch in thickness, and secure it in its place by screws, blocks, and glue. Others make use of thinner wood, not exceeding ⅜ in thickness, with a covering of canvas, or a loose woven fabric called "scrims," glued to its inner surface, with the edges of the same turned up and glued to the framing. This method would seem to be the best, for sundry reasons which have been confirmed by experience. The canvas adds very much to the strength of the panel, while it prevents the wood from cracking or warping. A simple test is sufficient to show that a panel of thin wood, properly canvased, will resist a blow which would be ruinous to a thicker piece of wood, secured merely by nails and blocks. The strength and tenacity of the cloth, in its combination with the wood, resists the force of the impact, so as to cause an instant rebound of the sledge or hammer, leaving no other mark than a dent. There is also a material saving in weight, amounting to not less than twenty per cent. The canvased panel also wears best in the long run of ordinary usage. If well put on, it imparts more of a unity to the entire car side, by merging the detached pieces virtually into one, and thus giving to the whole greater strength as a truss than it would otherwise have. The work, in order to secure these results, must of course be well done. If the canvasing is intrusted to boys, or to workmen who are careless or indifferent, they should be subject to rigid supervision and inspection.

The use of thick panels and blocking instead of thin ones and canvas, is manifestly a backward movement as regards improvement in construction, for the reasons above stated, especially those relating to strength and weight, a ⅜ canvased panel being as strong, and a good deal lighter, than a ¾ or even inch panel, without canvas. As regards cost, the plain uncanvased panel is doubtless somewhat cheaper, and when repairs have to be made which require the panels to be taken off, it is more difficult to remove those which have been well canvased, and adhere firmly to the framing; but in the long run, there is a compensation for this in the reputation acquired by the builder for turning out good work.

A Pen Portrait of Vanderbilt.

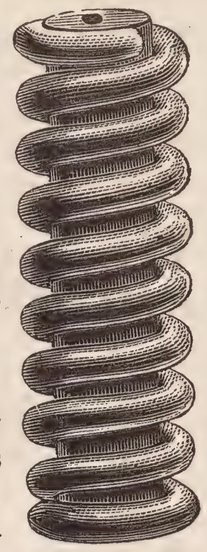
COMMODORE VANDERBILT is on the verge of eighty. His tall, lithe, erect form begins to droop. His natty white cravat, indicating the gentleman of the old school, is crumpled; his wilted collar indicates the neglect of years, but he is a power still. He makes a sensation whenever he walks into Wall street. He can produce a panic in an hour if he will. If he has a cold and takes catnip tea, it affects the money interests of Lombard and Wall streets. His early physical training did much for him. As a boy he never strained himself. He had physical exercise that developed, but did not dwarf him. He has always been pure in his life, and is as delicate in his sensibilities to-day as a woman. An offensive story in his presence maddens him. There is not a mechanic in New-York who lives more plainly; his blood has never been heated by liquors, he has not destroyed his appetite by stimulants. His breakfast would do for an anchorite—a cup of coffee, plain toast, and the white of an egg. His dinners are equally frugal, he keeps no late hours; company or no company, he moves off to bed at ten. He prefers the society of a few friends to a hot soirée. The simple Moravian airs of his boyhood, played by his accomplished wife on the piano, are sweeter music to him than the crash and fury of the opera. In his business, he is cool, collected, and self-reliant. The fume, fretting, and wasting of exciting business is done by others and not by himself. He never sells what he does not own, nor buys what he can not pay for, and he reads men with the intuition of a prophet. He locks up his business affairs in his bosom, and as he says, can change his mind when he chooses without being accused of vacillation. He touches nothing that he does not control. He is at nobody's mercy, nobody can betray him, sell him out, buy him, or thwart his plans.—*Exchange.*

A PARAGRAPH appeared on page 219 of our last number, stating that the new "Mogul" engine, No. 427, belonging to the Baltimore and Ohio Railroad, was built by the Baldwin Locomotive Works, of Philadelphia. This, we are informed, is an error. The engine was built by the Danforth Locomotive and Machine Co., of Paterson, N. J., and is one of twenty-five engines built by the same company this year for the above-named road, all of the same class or "Consolidation" pattern, and not "Mogul." They are very powerful machines, as will appear from the fact that the one referred to took on its trial trip 50 loaded hoppers, containing 500 tons of coal, at the rate of 23 miles an hour, on the heaviest grade, the total weight of the train being over 1,500,000 pounds. The builders have sent us a beautiful photograph of one of this class of engines, No. 433, which conveys an idea of their ponderous dimensions and the perfection and mechanical completeness of their construction. We are glad to make this correction, as the builders are entitled to due credit for such splendid specimens of workmanship.

THE bridge and car-works of F. E. Canda & Co., of Chicago, are now employing 200 men; the works, however, have a capacity for 400, to turn out 6 passenger-cars per month, and 14 freight-cars per day, together with street railway-cars, bridges, turn-tables, water stations, and all kindred structures used upon railways. These works occupy 15 acres of ground, with one half mile of river front, and with their rail connections they have ample facilities from their shops for transportation by water and railway They are now building passenger-coaches for the Cairo and St. Louis narrow-gauge road. These are equipped with the Blackstone platform, the body of the car is 7 by 40 feet, the first class seat 30 persons, and the second class 40. The sills are 31 inches from the rail; wheels, 26 inches diameter; the axles 3½ inches diameter. The freight-cars are 6 ft. 3 in. by 22 feet; capacity, 8 tons; wheels same diameter as those of passenger-cars; diameter of axle, 3¼ inches.

THE Cairo and Fulton Railroad has been completed to Fulton, Ark., a distance of 461 miles. The Texas connection will now be pushed forward, and in a short time there will be an unbroken line from St. Louis to northern and eastern Texas, and Shreveport, La.

THE work on the new Bergen Hill tunnel for the Delaware, Lackawanna, and Western Railroad has begun. It will be finished in twenty-one months. The length is 4250 feet, width 28 feet, leaving a space for a double track. The contractor agrees not to use glycerine or giant powder.



THE cut represents a ten-coil rubber-centre spiral spring, 2 inches in diameter and 5½ long; and the adjoining table shows the carrying capacity of any number of them, from 2 to 48, under a depression ranging from 27-100ths of an inch to one inch and 33-100ths. The maximum working load depresses the springs 83-100ths of an inch. The weight is expressed in decimals of gross tons in the large table, and by pounds in the smaller one. The weight of the springs is also given in the right-hand column. The figures will be found very convenient in estimating the number of spirals required for a car of a given weight.

TABLE showing the Elasticity of Vose, Dinsmore & Co.'s Rubber-Centre Spiral Springs, and the Number required for carrying various Loads.

LOAD IN GROSS TONS.

¶10-Coil Rubber Centre Spiral Springs.				Maximum Working Load.							Weight of Springs per Load to be Carried.
Elasticity in Inches.....	0.27	0.45	0.67	0.83	0.98	1.09	1.16	1.22	1.28	1.33	LBS.
2 Springs with Rubber Centres....	0.223	0.446	0.669	0.893	1.116	1.339	1.562	1.785	2.008	2.232	3.75
4 " " " "	0.446	0.892	1.338	1.786	2.232	2.678	3.124	3.570	4.016	4.464	7.50
6 " " " "	0 669	1.338	2.007	2 679	3.348	4.017	4.686	5.355	6.024	6.696	11.25
8 " " " "	0.892	1.784	2.676	3.572	4.464	5.356	6.248	7.140	8.032	8.928	15.00
10 " " " "	1.115	2.230	3.345	4.465	5.580	6.695	7.810	8.925	10.040	11.160	18.75
12 " " " "	1.338	2.676	4.014	5.358	6.696	8.034	9.372	10.710	12.048	13.392	22.50
14 " " " "	1.561	3.122	4.683	6.251	7.812	9.373	10.934	12.495	14.055	15.624	26.25
16 " " " "	1.784	3.568	5.352	7.141	8.928	10.712	12.496	14.280	16.064	17.856	30.00
18 " " " " ...	2.007	4.014	6.021	8.037	10.044	12.051	14.058	16.065	18.072	20.078	33.75
20 " " " " ...	2.230	4.460	6.690	8.930	11.160	13.390	15.620	17.850	20.080	22.320	37.50
22 " " " " ...	2.453	4.900	7 660	9.820	12.270	14.720	17.180	19.630	22.088	24.552	41 25
24 " " " " ...	2.676	5.350	8.020	10 710	13.390	16.060	18.740	21.420	24.096	26.784	45.00
26 " " " " ...	2.899	5.800	8.690	11.610	14.500	17.400	20.300	23.200	26.104	29.016	48.75
28 " " " "	3.122	6.240	9.360	12.500	15 620	18.740	21.860	25.000	28.112	31.248	52.50
30 " " " "	3.345	6.690	10.030	13.390	16.740	20.080	23.430	26.770	30.120	33.480	56.25
32 " " " "	3.568	7.130	10.700	14.280	17.850	21.420	25.000	28.560	32.128	35.712	60.00
34 " " " "	3.791	7.580	11.370	15.180	18.970	22 760	26.560	30.340	34.136	37.944	63 75
36 " " " " ...	4.014	8.020	12 040	16.070	20.080	24.100	28.120	32.130	36.144	40.176	67.50
38 " " " "	4.237	8.470	12.710	16.870	21.200	25.440	29.670	33.910	38.152	42.408	71.25
40 " " " "	4.460	8.920	13.380	17.860	22.320	26.780	31.240	35 700	40.160	44.640	75.00
44 " " " "	4.906	9.810	14.710	19.640	24.550	29.450	34.360	39.270	44.176	49.104	82.50
48 " " " "	5.352	10.700	16.050	21.430	26.780	32.130	37.480	42.840	48.192	53.568	90.00

The above calculations are based upon Tests made by Mr. David Kirkaldy, at his Testing Works, Southwark, England.

TESTS, IN POUNDS, OF TWO OF THE ABOVE SPRINGS.

Length of Springs.	Diameter of Springs.	Diameter of Steel.	Weight of Two Springs & Rubbers.	Stress in Pounds, Depression Inch.										
				500	1000	1500	2000	2500	3000	3500	4000	4500	5000	
INCHES.	INCHES.	INCHES.	LBS.											
5.50	2.02	.38	3.72	.27	.45	.67	.83	.98	1.09	1.16	1.22	1.28	1.33	Without Set.

THE ticket-office of the Pittsburg, Fort Wayne, and Chicago Railway, on the corner of Clark and Randolph streets, Chicago, is thus described by the *Inter-Ocean:* The floor is laid with the Minturn tile, inlaid with mosaic work. Two crystal chandeliers, with prismatic pendants, hang in the centre of the room, while stork standards and brackets, with globes of exquisite workmanship to match, are ranged about the room. The ticket-case is a fine piece of railway office furniture, manufactured of black-walnut, inlaid with veneered French walnut. The masterpiece in the office is the counter, which is made of the finest solid black-walnut, set with French walnut and butternut, a combination of colors which gives it an attractive appearance. The top is made of the finest polished Lisbon marble, of a mottled hue, which was manufactured at the company's shops at Fort Wayne. Around the base of the counters, the entire length, is placed a silver-plated railing, to protect the wood-work. The ceiling of the office is finely frescoed.

THE general manager of the Atlantic and Great Western Railway has issued the following instructions to the employees of that road: "Treat people as if you appreciated and were willing to acknowledge their custom. Try to accommodate and please. In short, act as any good business man would toward his customers. Don't treat people as if you were conferring a favor on them by letting them ride. Rather seek to make the line popular, because its business is dependent on the good will of the people. You need not be ashamed to let people understand that you acknowledge this. If a passenger refuses to pay, or is rough and abusive, treat him with courtesy, but firmness."

MR. C. F. ALLEN, late manager of the shops of the Pullman Palace-Car Company, at Detroit, was presented, on the occasion of his retirement from that position, with an elegant Steinway piano, valued at $650, by the employees of the company and business friends in Detroit.

THE PAINTER'S VISION.—We leave out a part of our list of superintendents and purchasing agents, to make room for an illustration showing the progress in the manufacture of painters' colors which has been made, with the aid of science and machinery and well-directed enterprise, within the past century. The central design represents William Post, grinding paints by the hand-labor process a hundred years ago; in the lower right-hand corner is the store in which his business was carried on; the battle-scenes of our three wars indicate the historical progress of the country; the present age is shown in the steam-power mill turning out its pigment-stream automatically; and the several factories of Messrs. C. T. Raynolds & Co., located respectively in Brooklyn, Morrisania, and New-Jersey, are also shown; also their stores in Fulton street. The business founded by William Post has grown from its small beginning, as shown in the cut, until it has reached its present dimensions of three millions of dollars per annum, under the auspices of the above-named firm, who are his present successors. We refer to their advertisement on page 254.

A GENTLEMAN whose memory is not quite so good as it used to be, when he has any thing particular to remember next morning, makes a practice of turning one of the pictures in his bed-room with the face to the wall. He finds it very amusing next day in trying to recollect what he turned it for.

NOT only is Barnum's cannibal on a strike, but his new gorilla is giving Phineas considerable trouble, because the great showman insists that the animal must not swear when fleas bite him, especially if ministers with their families are standing in front of the cage.

IT was a Portland chap who, after coming to a railroad crossing the other day, and reading the sign, "Look out for the locomotive," climbed to the top, and, on gazing up the track, wanted to know "wher'n thunder the old thing was?"

HORSES are so plentiful in Australia that they are sold by the "pound," at prices ranging from sixpence to a shilling, and local papers think they would fetch more if put up in small cans for the Paris market. No doubt of it.

"CAN NOT something be done to prevent young ladies from being insulted on our streets at night?" asks a Cincinnati paper. There can. Just have the girl's mother tuck her into her little bed about eight o'clock in the evening, and lock the door on her.

ON a tombstone in South-Carolina is the following beautiful tribute to departed worth:

"Here lies the body of Robert Gordin,
Mouth almighty, and teeth ackordin;
Stranger, tread lightly over this wonder,
If he opens his mouth, you are gone, by thunder."

AT one of the ragged-schools in Ireland, a clergyman asked the question, "What is holiness?" A pupil in dirty, tattered rags jumped up and said, "Plaze yer riverence, it is to be clane inside."

AN exchange says, "When you see a bare-headed man following a cow through the front-gate, and filling the air with garden implements and profanity, you may know that his cabbage plants have been set out."

AN applicant for a pair of boots at one of our shoe-stores was asked what number he wore, and replied, as soon as he recovered from his surprise, "Why, two, of course."

"WHATEVER God has made is perfect," said a Western preacher. "What do you think of me?" said a hunchback, rising and exhibiting his own deformity, "Why, you are as perfect a hunchback as I ever saw."

A MILESIAN astounded a grocer by entering his store with this request: "Mister McGra, would you lind me an empty barrel of flour to make a hen-coop for me dog?"

HENRY K. W. HALL,

DEALER IN

DRAFTING PAPER,

FOR THE USE OF

ARCHITECTS AND BUILDERS.

Any width or weight furnished to order.

ALSO,

FINE TWINES.

H. K. W. HALL,

114 Washington Street,

BOSTON.

JEWETT & SONS PERFECTLY PURE WHITE LEAD TRADE MARK

This is the **ONLY QUALITY** of White Lead that we have made for the last 15 years.

JOHN JEWETT & SONS,

182 Front Street, New-York.

ESTABLISHED 1858.

Highest Premium awarded by the American Institute Fair, 1871.

TRADE MARK. PATENTED.

An Indestructible Coating for Iron, Tin, and Wood.

Prince's Metallic Paint

Is acknowledged, wherever known, to be the

BEST AND CHEAPEST PAINT IN THE MARKET.

WASON MANUFACTURING COMPANY,
RAILWAY CARS, CAR WHEELS, AND RAILWAY CASTINGS,
SPRINGFIELD, MASS., October 4, 1871.

GENTS: We have used Prince's Metallic Paint exclusively for several years. If we did not believe it to be the best we would not use it. Yours truly, GEORGE C. FISK, Pres't.

CHICAGO, BURLINGTON AND QUINCY RAILROAD,
AURORA, ILL., March 5, 1873.

GENTS: We have used your Metallic Paint about 12 years, more especially on locomotive work, and before adopting it, put it to the most severe tests of extreme heat and strong brine, at the same time testing comparatively, lead (white and red) and other Metallic Paints, and in these tests the "Prince's" came out ahead. I am satisfied that for engine and other iron work it is superior to any paint in use. Our paint-shop was painted two coats with it and boiled oil in February, 1863, and the paint is in good condition at this date, not having been painted since 1863. Respectfully, D. C. COOLEY.

For Sale, Dry and in Oil, by the Trade, and by

PRINCE'S METALLIC PAINT CO.,

MANUFACTURERS,

96 Cedar Street, New-York.

☞ All packages are marked with name and trade-mark.

Send for a Circular.

PHELPS, DODGE & CO.,

Cliff St., between John and Fulton,

NEW-YORK,

IMPORTERS AND DEALERS IN

Tin and Roofing Plates

OF ALL SIZES AND KINDS.

Pig, Tin, Russia Sheet-Iron, Charcoal and Common Sheet-Iron, Lead, Sheet Zinc, Copper, Spelter, Solder, Antimony, Etc.

MANUFACTURERS OF

Copper, Brass and Wire.

JEWETT'S PERFECTLY PURE LINSEED OIL RAW, BOILED & REFINED.

MANUFACTURED BY

JOHN JEWETT & SONS,

182 Front Street, New-York.

C.T.RAYNOLDS & CO'S

SUPERFINE

QUICK DRYING

COACH COLORS.

ESTABLISHED 1770.

106 AND 108 FULTON ST. N.Y.

PREPARED EXPRESSLY FOR THE FINEST DESCRIPTION OF

Car and Locomotive Decoration.

OUR OWN SPECIAL BRANDS OF SUPERIOR RAILWAY VARNISHES,

Are now used by some of the most extensive Railroads in the country, and are particularly recommended.

Car Manufacturers.

Allison, W. C. & Sons	Philadelphia Pa.
Anderson, J. R. & Co	Richmond, Va.
Altoona Manufacturing Co	Altoona, Pa.
Adrian Car Co	Adrian, Mich.
Arlington Car Manufacturing Co	Arlington, Vt.
Atlantic Car-Works	Salem, Mass.
Barney & Smith Manufacturing Co	Dayton, Ohio.
Baker, Jackson & Co	Latrobe, Pa.
Bellefonte Car Manufacturing Co	Bellefonte, Pa.
Billmeyer & Smalls	York, Pa.
Bradley, Osgood	Worcester, Mass.
Bridgeport Car-Works	Bridgeport, Pa.
Brill, J. G. & Co	Philadelphia, Pa.
Buffalo Car Co	Buffalo, N. Y.
Canada Car Co	Toronto, Canada.
Canada Steam-Engine Co	Kingston, Canada.
Canda, F. E & Co	Chicago, Ill.
Cartersville Car Co	Cartersville, Ga.
Central Car & Manufacturing Co	Jackson, Mich.
Clendenning, W. W	Montreal.
Cummings Car-Works	Jersey City, N. J.
Connellsville Machine and Car Co	Connellsville, Pa.
Corunna Car Co	Corunna, Mich.
De Pere Iron-Works	De Pere, Wis.
Detroit Car-Works	Detroit, Mich.
Detroit Car and Manufacturing Co	Detroit, Mich.
Dawson Manufacturing Co	Dawson, Ga.
Dickey, Neill & Co	Toronto.
Dickson Manufacturing Co	Scranton, Pa.
Erie Car-Works	Erie, Pa.
Elmira Car-Works	Elmira, N. Y.
Frederick & Co	Catasauqua, Pa.
Freas Brothers & Thornton	Berwick, Pa.
Fremont Car Co	Fremont, Ohio.
Gardner, F. & Co.	Carlisle, Pa.
Gill, John L	Columbus, Ohio.
Gilbert, Bush & Co	Troy, N. Y.
Goold, James & Co	Albany, N. Y.
Goodrich Car Co	Augusta, Ga.
Hannibal Car Works	Hannibal, Mo.
Haskell & Barker Car Co	Michigan City, Ind.
Harrisburg Car Manufacturing Co	Harrisburg, Pa.
Heathcote, Herbst & Co	Glen Rock, Pa.
Hamilton, William & Son	Toronto.
Harlan & Hollingsworth Co	Wilmington, Del.
Herrick Car-Works	Oswego, N. Y.
Huntingdon Car-Works	Huntingdon, Pa.
Indiana Car Co	Cambridge City, Ind.
Indianapolis Car Co	Indianapolis, Ind.
Jackson & Sharp Co	Wilmington, Del.
Jackson & Woodin Manufacturing Co	Berwick, Pa.
Jones, J. M. & Co	West-Troy, N. Y.
Kimball Manufacturing Co	San Francisco, Cal.
Keith, H. T. & I. N	W. Sandwich, Mass.
Laporte Car Manufacturing Co	Laporte, Ind.
Lombard, Thomas	Augusta, Me.
Lebanon Manufacturing Co	Lebanon, Pa.
Lehigh Car Manufacturing Co	Stemton, Pa.
Litchfield Car Manufacturing Co	Litchfield, Ill.
Mansfield Machine-Works	Mansfield, Ohio.
Michigan Car Co	Detroit, Mich.
McNairy, Claflen & Co	Cleveland, Ohio.
Murray, Dougall & Co	Milton, Pa.
McVay, Walker & Co	Braddock's Field, Pa.
Mowry Car and Wheel Works	Cincinnati, O.
Middletown Car & Manufacturing Co	Middletown, Pa.
Missouri Car and Foundry Co	St. Louis, Mo.
New-Haven Car Co	New-Haven, Ct.
Niblo, James M	Conshohocken, Pa.
Northumberland Car & Mfg. Co	Northumberland, Pa.
Ohio Falls Car Co	Jeffersonville, Ind
Ontario Car Co	London, Ont.
Patten Car-Works	Bath, Maine.
Peabody & Crangie Bro's	Calais, Me.
Peters, Simon	Quebec.
Piqua Car and Agricultural Works	Piqua, Ohio.
Pittsburg Car-Works	Pittsburg, Pa.
Pittsburg and McKeesport Car Co	McKeesport, Pa.
Pittsburg Car and Locomotive Co	Pittsburg, Pa.
Portland Co	Portland, Me.
Pullman Car Co	Chicago.
Peregoy, J. H	Houston, Texas.
Ranlet Car Manufacturing Co	Laconia, N. H.
Russell & Co	Massillon, Ohio.
Sands, William L	Pottstown, Pa.
Schall, Michael	York, Pa.
Schenectady Car-Works	Schenectady, N. Y.
Shaaber & Johnston	Reading, Pa.
Southern Car-Works	Independence, La.
South-Western Car Co	Jeffersonville, Ind.
Shoenberger & Bryant	Duluth, Minn.
Seath & Hager	Terre Haute, Ind.
St. Charles Manufacturing Co	St. Charles, Mo.
Stephenson, John & Co	New-York, N. Y.
Taunton Car Co	Taunton, Mass.
Tredegar Co	Richmond, Va.
Tiffin Car-Works	Tiffin, Ohio.
Vigo Foundry and Terre Haute Car-Works	Terre Haute, Ind.
Watsontown Car Co	Watsontown, Pa.
Wharton, Thomas J	Brunswick, Ga.
Whittaker, Phillips & Co	Toledo, Ohio.
Wason Manufacturing Co	Springfield, Mass.
Weimer, P. L & Bros	Lebanon, Pa.
Wyoming Valley Manufacturing Co	Wilkesbarre, Pa.
Wells, French & Co	Chicago, Ill.
Wilmington Car-Works	Wilmington, Del.

Car-Wheel Manufacturers.

Albany Car-Wheel Works	Albany, N. Y.
American Paper Car-Wheel Co	Pittsford, Vt.
Atlantic Iron-Works	Portsmouth, Va.
Baltimore Car-Wheel Foundry Co	Baltimore, Md.
Barnum & Richardson Manufacturing Co	Chicago, Ill.
Barney & Smith Manufacturing Co	Dayton, Ohio.
Bass & Hanna	Fort Wayne, Ind.
Bailey, Howson & Co	St. Paul, Minn.
Blanchard & Arnold	Milwaukee, Wis.
Boston Car-Wheel Co	Camb'gep't, Mass.
Bowler, Mayer & Brayton	Cleveland, Ohio.
Chicago Car-Wheel Co	Chicago, Ill.
Davenport, Fairbairn & Co	Erie, Pa.
Dawson Manufacturing Co	Dawson, Ga.
Detroit Car-Wheel Works	Detroit, Mich.
Fulton Foundry Co	Cleveland, Ohio.
Gill, John L. Jr	Allegheny City, Pa.
Green, D. P. & Co	St. Louis, Mo.
Hamtramck Car-Wheel Works	Detroit, Mich.
Haskell & Barker Car Co	Michigan City, Ind.
Harrisburg Car Manufacturing Co	Harrisburg, Pa.
Heartt, Jonas S. & Co	Troy, N. Y.
Jackson & Woodin	Berwick, Pa.
John L. Gill	Columbus, Ohio.
Lehigh Car-Wheel & Axle Works	Catasauqua, Pa.
Lobdell Car-Wheel Works	Wilmington, Del.
London Car-Wheel Co	London, Can.
Louisville Car-Wheel & Railway Supply Co	Louisville, Ky.
Middlebrook & Mack	Oswego, N. Y.
Missouri Car and Foundry Co	St. Louis, Mo.
Moore Elastic Car-Wheel Co	Jersey City, N. J.
Mowry Car and Wheel Works	Cincinnati, Ohio.
Ohio Falls Car Co	Jeffersonville, Ind.
Pettengill, Glass & Co	Cleveland, Ohio.
Quealey, W. J	Hannibal, Mo.
Ramapo Wheel & Foundry Co	Ramapo, N. Y.
Rutland Foundry & Machine Co	Rutland, Vt.
Sterling Car-Wheel Foundry	Columbus, Ohio.
Scoville, J. & N. C	Buffalo, N. Y.
St. Louis Car-Wheel Co	St. Louis, Mo.
Taylor Iron Works	High Bridge, N. J.
Thompson, Duglas	Bordentown, N. J.
Tredegar Company	Richmond, Va.
Toronto Car-Wheel Co	Toronto, Can.
Washburn, Hunts & Co	Jersey City, N. J.
Washburn Car-Wheel Manufacturing Co	Worcester, Mass.
Wason Manufacturing Co	Springfield, Mass.
Whitney A. & Sons	Philadelphia, Pa.
Woodbury & Company	E. Cambr'ge, Mass.
Wyoming Valley Manufacturing Co	Wilkesbarre, Pa.

Locomotive Builders.

Baldwin Locomotive Works	Philadelphia, Pa.
Brooks Locomotive Works	Dunkirk, N. Y.
Danforth & Cooke	Paterson, N. J.
Dawson & Baily (light locomotives)	Connellsville, Pa.
Dickson Manufacturing Co	Scranton, Pa.
Grant Locomotive Works	Paterson, N. J.
Hinckley Locomotive Works	Boston, Mass.
Manchester Locomotive Works	Manchester, N. H.
Mason, William	Taunton, Mass.
McKay Iron and Locomotive Works	Jersey City, N. J.
Portland Company	Portland, Me.
Porter, Bell & Co. (light locomotives)	Pittsburg, Pa.
Pittsburg Locomotive Works	Pittsburg, Pa.
Rogers Locomotive Works	Paterson, N. J.
Rhode Island Locomotive Works	Providence, R. I.
Schenectady Locomotive Works	Schenectady, N.Y.
Taunton Locomotive Works	Taunton, Mass.

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BUFFALO PRESSURE AND VACUUM GAUGES,

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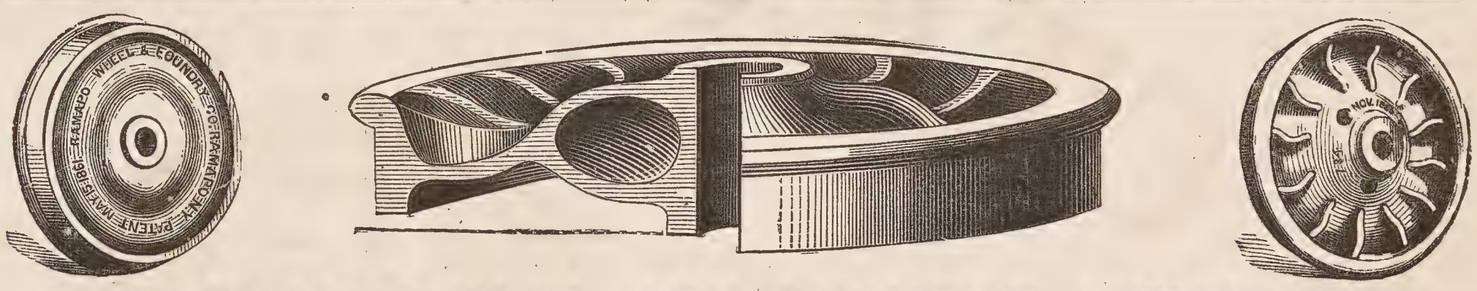
Reflectors Re-plated, Gauges of all kinds and Locomotive Balances Repaired at Short Notice.



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Railroad.	*Master-Mechanic.*	*Master Car-Builder.*	*Residence.*
A			
Arkansas Central	G. H. Bristol	G. H. Bristol	Helena, Ark.
Alabama Central	E. M. Smith	E. M. Smith	Selma, Ala.
Albany & Susquehanna	R. C. Blackall	R. C. Blackall	Albany, N. Y.
Alexandria & Fredericksburg			Alexandria, Va.
Alexandria, Nebraska & Iowa	Geo. Q. Adams		Alexandria, Mo.
Atchison, Topeka & Santa Fe	H. V. Farris		Topeka, Kans.
Atchison & Nebraska	Selah Williams		Atchison, Kan.
Alabama & Chattanooga	S. W. Tozer	S. W. Tozer	Chattanooga, Tenn.
Atlanta & West-Point	Wm. Rushton		Atlanta, Ga.
Atlanta & West-Point	R. D. Cole	R. D. Cole	Newnan, Ga.
Atlantic & Gulf	C. E. Van Vorst	P. N. Raynal	Savannah, Ga.
Atlantic & North-Carolina	E J. Clayton	E. J. Clayton	New-Berne, N. C.
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Atlantic & Great Western	William Fuller	D. S. Dockstader	Meadville, Pa.
Atlantic & Great Western	N. Wright	W. G. Haggard	Cleveland, Ohio.
Atlantic & Great Western	‖J. B. Miller.	S. V. Smith	Kent, Ohio.
Atlantic & Great Western	Allen Cook	J. W. Holmes	Galion, Ohio.
Atlantic & Pacific	§John Hewitt	E. Martin	St. Louis, Mo.
Atlantic, Mississippi & Ohio			
Norfolk & Petersburg Division	J. S. Whitworth	J. S. Whitworth	Norfolk, Va.
South-Side of Virginia "	J. T. Robinett	J. T. Robinett	Petersburg, Va.
Virginia & Tennessee "	F. Sterk	W. A. Morgan	Lynchburg, Va.
Virginia & Kentucky "			
Allegheny Valley	G. W. Glass	R. Gunning	Pittsburg, Pa.
Androscoggin	Ira K. Russell	C. S. Greenwood	Farmington, Maine.
Adirondack	Jacob Myers	James J. Traver	Saratoga, N. Y.
B			
Baltimore & Ohio	§John C. Davis	J. S. Shryack.	Baltimore, Md.
Baltimore & Ohio		James H. Miller	Baltimore. Md.
Baltimore & Ohio	Wm. Edwards		Martinsburg, Va.
Baltimore & Ohio	A. J. Cromwell		Piedmont, Va.
Baltimore & Ohio	E. W. Lippencott		Grafton, W. Va.
Baltimore & Ohio			Wheeling, W. Va.
Central Ohio Division	Alex. Platt		Zanesville, Ohio.
S'dusky, Mans., & New'k Div.	Wm. Y. Johnson		Sandusky, Ohio.
Bangor, Old Town & Milford	J. B. Peckham	John H. Brown	Bangor, Maine.
Bangor & Piscataquis	Horace Penny	J. W. Comins	Old Town, Maine.
Bellefonte & Snow Shoe	H. D. Landis	H. D. Landis	Bellefonte, Pa.
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Boston & Albany	Wilson Eddy	F. D. Adams	Springfield, Mass.
Boston & Albany	A. B. Underhill	W.E.Chamberlain	Allston, Mass.
Boston & Providence	George Richards.	John Lightner	Roxbury, Mass.
Boston, Clinton & Fitchburg	John Webster	Samuel Stevens	Fitchburg, Mass.
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Boston & Maine	F. A. Waitt		Boston, Mass.
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Boston, Lowell & Nashua	J. F. Crockett	T. G. Davis	Boston, Mass.
Boston, Lowell & Nashua		S. A. Davis	Nashua, N. H.
Blossburg & Corning	O. C. Patchell	O. C. Patchell	Corning, N. Y.
Brockville & Ottawa	H. J. Marshall	H. J. Marshall	Brockville, Can.
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Burlington & Missouri River	J. Christiansen		Plattsmouth, Neb.
Burlington, Cedar Rapids & Minn	R. W. Bushnell	R. W. Bushnell	Cedar Rapids, Iowa.
Buffalo, New-York & Phila	Allen Vail		Buffalo, N. Y.
Buffalo, Corry & Pittsburg	Thomas Connell	Thomas Connell	Corry, Pa.
C			
Cairo & Fulton	L. Finlay	L. Finlay	Little Rock, Ark.
California Pacific	A. J. Stevens	D. Rutherford	Vallejo, Cal
Camden & Amboy	F. B. Stevens T. T. Kerr Thomas Single	E. Lockwood	Hoboken. Bordentown, N. J. South-Amboy.
Camden & Atlantic	Rufus Hill	S. Wills	Camden, N. J.
Canada Southern	C. E. Benton	C E. Benton	St.Thomas, Canada.
Carolina Central	W. A. Gill	Thos Myers	Laurinburg, N. C.
Catawissa	A. J. Prescott	C. D. Ellis	Catawissa, Pa.
Catasauqua & Fogelsville	Thomas Evans	Chas. J. Holbach.	Catasauqua, Pa.
Carrolton & Oneida	M. T. Wiggins		Carrolton, Ohio.
Charleston & Savannah	H. T. Calder		Charleston, S. C.
Chesapeake & Ohio	W. G. Freeman	J. N. King	Richmond, Va.
Chesapeake & Ohio	§T. J. Hamer		Huntingdon, W.Va.
Cheraw & Darlington	D. W. Haines	A. M. Corrie	Florence, S. C.
Champlain Trans. Co.	H. T. Calder		Burlington, Vt.
Cheshire & Ashuelot	F. A. Perry	F. A. Perry	Keene, N. H.
Charlotte, Columbia & Augusta	Robert King	J. Q. Seats	Columbia, S. C.
Chicago & North-western	§Geo. W. Tilton	Thomas Hull	Chicago, Ill.
Wiscon. Mad. & Mill. Divis		Henry Hull	Fond du Lac, Wis.
Galena Division	D. Manning	Hugh Gray	Chicago, Ill.
Wiscon. Mad. & Mill. Divis	T. B. Tilton		Chicago, Ill.
Iowa Division	C. C. Elliott	William Campbell	Clinton, Iowa.
Peninsula Division			Escanaba, Mich.
Chicago & Alton	John A Jackman	R. Reniff	Bloomington, Ill.
Chicago, Burlington & Quincy	‡Geo. Chalender		Burlington, Iowa.
Eastern & Middle Division	E. T. Prindle	W. W. Wilcox	Aurora, Ill.
Galesburg Division	Wm. Wilson	J. D. Besler	Galesburg, Ill.
Quincy Division	Joel West		Cresson, Iowa.
Burlington Division	S. E. Burtch		Burlington, Iowa.
Buda Division	P. R. Sutton		Buda, Ill
Chicago, Clinton & Dubuque	P. R. Sutton		Dubuque, Iowa.
Chicago, Dubuque & Minnesota	P. R. Sutton		Dubuque, Iowa.
Chicago, Rock Island & Pacific	T. B. Twombly	B. K. Verbryck	Chicago, Ill.
Chicago & Michigan Lake Shore	Wm. L. Fitch.	Oliver Udell	St. Joseph, Mich.
Chicago, Danville & Vincennes	A. B. Bedell	W. H. Dunham,	Danville, Ill.
Chicago, Danville & Vincennes	J. M. Sanborn		Chicago, Ill.
Chicago & Canada Southern	§§J. Johann		Trenton, Mich.
Cincinnati, Wabash & Michigan	E. M. Porter		Wabash, Ind.
Cleveland, Col., Cin., & Indianapolis	‡L. S. Young	William F. Smith	Cleveland, Ohio.
Indianapolis Division	L. W. Durgin		Galion, Ohio.
Indianapolis Division		R. Attridge	Indianapolis, Ind.
Cincinnati Divison	D. Carmichael		Delaware, Ohio.
Columbus Division	F. G. Kaufholz		Cleveland, Ohio.
Cleveland and Pittsburg	N. E. Chapman	A. Steinbrunner	Cleveland, Ohio.
Cleveland, Mt Vernon & Delaware	J. W. Holloway	J. W. Holloway	Akron, Ohio.
Cincinnati, Hamilton & Dayton	William Cullen.	W. H. H. Allison.	Cincinnati. Ohio.
Cincinnati & Indianapolis Junction	W. McKinzie	Edwin Beeny	Indianapolis, Ind.
Cincinnati, Lafayette & Chicago	Charles E. Gore		Lafayette, Ind.
Cincinnati & Muskingum Valley	Leroy Kells	Daniel Jewell	Lancaster, Ohio.
Cincinnati, Sandusky & Cleveland	John Y. Beattie	John Y. Beattie	Sandusky, Ohio.
Cobourg, Peterboro & Marmosa	Wm Polson		Cobourg, Canada.
Columbus, Chicago & Indiana Central	(See Pitts. Cinn. & St. Louis)		
Concord	Chs. L. Eastman	M. W. Dickerman	Concord, N. H.
Concord & Portsmouth	C. L. Eastman	M.W. Dickerman.	Concord, N. H.
Concord & Claremont	J. N. Lander	A. Langmaid	Concord, N H.
Connecticut River	§Wm. H. Stearns		Springfield, Mass.
Connecticut Valley	C. W. Hollister	N. A. Smith	Hartford. Ct.
Connecticut Western	N. Slingland		Hartford. Ct.
Contoocook River			Concord, N. H.
Conn. & Passumpsic Rivers	Horace Alden	Horace Alden	Lyndon. Vt.
Cumberland Valley	A. S. Hull	C. W. Nitterhouse	Chambersburg, Pa.
Cumberland & Pennsylvania	W. L. Jordan	J. W. Sauerbach	Mt. Savage, Md.
Central of Georgia	D. D. Arden	C. C. Millar.	Savannah, Ga.
Central of New-Jersey	*T. W. Peeples	George Hackett	Elizabethport, N. J.
Lehigh & Susquehanna Div.	L. C. Brastow	L. C. Brastow	Wilkesbarre, Pa.
Central Branch Union Pacific	Wm D. Rowley		Atchison, Kansas.
Central R. R. of Iowa	F. B. Woodruff	T. L. Seevers	Marshall, Iowa
Central Pacific	A. J. Stevens	Benjamin Welch	Sacramento, Cal.
D			
Dakota & Southern	Jas. Whitney	A. A. Meckling	Sioux City, Iowa.
Davenport & St. Paul's	George Gregg		Peoria, Ill
Dayton & Union	A. J. Keenan	J. F. Feicht.	Dayton, Ohio.
Danbury & Norwalk	Charles A. Craig	C. A. Craig	Danbury, Ct.
Dayton & Michigan	William Cullen	W. H. H. Allison	Cincinnati, Ohio.
Denver & Rio Grande	John Greenwood		Denver, Col.
Delaware, Lackawanna & Western	Walter Dawson	Robert McKenna	Scranton Pa.
Morris & Essex Division	W. H. Lewis	L S. Barber	Hoboken, N. J.
Des Moines Valley	James Lamb	R. E. Smith	Keokuk, Iowa
Detroit, Ft. Wayne & Logansport	W. A. Carpenter		Bankers, Mich.
Detroit & Milwaukee	Andrew Wilson		Detroit, Mich.
Detroit. Lansing & Lake Michigan	Tho. G. Roberts		Detroit, Mich.
Delaware & Hudson Canal Co	James Dickson	Thomas Orchard	Carbondale, Pa.
Rensselaer & Saratoga Div.	John Dikeman		Troy, N. Y.
Dorchester & Delaware			Cambridge, Md.
Dubuque South-western	J. M. Smith	J. M. Smith	Farley. Iowa.
Dutchess & Columbia	W. G.Vanbuskirk	H. A. Webster	Fishkill, N. Y.
Dunkirk, Allegheny Val. & Pittsburg	J. C. Haggett	J. C. Haggett	Dunkirk, N. Y.
E			
Eastern		J. P. Somerby	Salem, Mass.
Eastern	John Thompson		East-Boston, Mass.
Eastern Kentucky	D. L. Weaver	D. L. Weaver	Riverton, Ky.
East-Tennessee & Virginia	Eli Hixon	Jos. Armbruster	Knoxville, Tenn.
East-Tennessee & Georgia	Eli Hixon		Knoxville, Tenn.
East Pennsylvania		Samuel Reeves	Reading, Pa
Elizabethtown and Paducah	W. D. Robb	T. A. Cordrey	Elizabethtown, Ky.
Erie Railway	‖‖M. E. Brown		Susquehanna, N. Y.
Erie Railway			Susquehanna, N. Y.
Erie Railway		C. A. Smith	Jersey City, N. J.
Erie Railway	J. G. Hubbard	M. Wilder	Buffalo, N. Y.
Erie Railway	W. E. Cooper	W. E. Cooper	Hornellsville, N. Y
Erie Railway		W. E. Rutter	Elmira, N. Y
Evansville & Crawfordsville	John L. White	Joseph Stiker	Evansville, Ind.
Evansville. Henderson & Nashville	H. M. Smith	W. H. H. Price	Henderson, Ky.
European & North Am. (of Maine)	A. O. Bailey	J. H. Brown	Oldtown, Maine.
Erie & Pittsburg	G. J. Parkin	G. J. Parkin.	Erie, Pa.
Evansville, Terre Haute & Chicago			Terre Haute, Ind.
F			
Flushing & North Side	Wm. La Suer		College Point, L. I.
Florida	Ezra Gray	G. Hernandez	Fernandina, Fla.
Flint & Pere Marquette	Sanford Keeler	Sanford Keeler	East-Saginaw, Mich.
Fitchburg	Geo. A. Cooledge	Enos Varney	Charlestown, Mass.
Fitchburg & Worcester	John Webster	Samuel Stevens	Fitchburg, Mass.
G			
Galveston, Harrisburg & San Antonio	Jno. G. Coulon		Galveston, Texas.
Gilman, Clinton & Springfield	W. B. McKenna		Springfield, Ill.
Grand Tower & Carbondale	Hugh Smith	Hugh Smith	Grand Tower, Ill.
Grand Trunk		Warren Noyes	Gorham, Me
Grand Trunk	†Richard Eaton	J. W. W. McWood.	Montreal, Canada.
Grand Trunk			Sherbrooke, Can.
Grand Trunk		B. J. Mitchell	Portland, Me.
Galveston, Houston & Henderson	Wm. Macbeth	Wm. Macbeth	Galveston, Texas.
Grand Rapids & Indiana	J. M. Boon		Fort Wayne. Ind.
Great Western of Canada	†Wm. A. Robinson	F. Childs	Hamilton, Canada.
Georgia	William Hardman.	T. M. Preval.	Augusta, Ga.
Green Bay & Lake Pepin	J. H. Erwin		Green Bay, Wis.
Greenville & Columbia	J. T. Price	J. T. Price	Helena, S. C.
H			
Harlem Extension	George W. Blanchard		Rutland. Vt.
Harlem Extension		C. S. Clapp	Bennington, Vt.
Hanover Branch	John J. Bingley	Henry Britcher	Hanover. Pa.
Hannibal & St. Joseph	L. W. Towne		Hannibal, Mo.
Hartford, Providence & Fishkill	Edwin Garfield	V. D. Perry	Hartford, Ct.
Hackensack & New-York	Abra'm Angausen		Hackensack, N. J.
Housatonic	C. R. Morris	J. J. Ferris	Bridgeport, Ct.
Houston & Texas Central	§W. H. Purdy	W. H. Purdy	Houston, Texas.
Houghton & Ontonagon			L'Anse, Mich.
Houston Tap & Brazoria	T. J. Shellhorn	T. J. Shellhorn	Houston, Texas.
Huntington & Broad-Top Mountain	J. Salisbury	M. Tellerhoof	Saxton, Pa.
Hempfield	T. Marsh		Wheeling, Va.
I			
Indianapolis, Cincinnati & Lafayette	J. S. Patterson	S. Griffith	Cincinnati, Ohio.
Indianapolis, Peru & Chicago	John McKenna	John McKenna	Peru, Ind.
Illinois Central	**S. J. Hayes	H. O. Wadlie	Chicago, Ill.
Chicago Division	Henry Schlacks		Chicago, Ill.
South Division	David Oxley		Centralia. Ill.
North Division	J. B. Edams		Amboy, Ill
Iowa Division	Thomas W. Place		Waterloo. Iowa.
Iowa & Missouri State Line			Farmington.Iowa
Iron	Perry Scott	Clem. Roetling	Ironton, Ohio.
Indianapolis & St. Louis	A. T. Sanford	R. B. More	Mattoon, Ill.
Indianapolis. Bloomington & Western	Tho. V. Losee	A. J. Allen	Urbana, Ill.
Ionia & Lansing	H. Loughlin		Lansing, Mich.
Indianapolis & Vincennes	A. E. Allcott		Indianapolis, Ia.
International & Great Northern	A. H. DeClercq	F. M. Looney	Houston, Texas.
Intercolonial	Wm. Whitney	Edw. Shaffer	Moncton, N. B.
Ithaca & Athens	F. A. Brown		Ithaca, N. Y.
J			
Jeffersonville, Madison & Indiana	Reuben Wells		Jeffersonville, Ind.
Junction & Breakwater	J. A. Maguire		Lewes, Del.
K			
Kansas Central	John Davis		Leavenworth, Kan.
Knox & Lincoln	§§E. R. Hamlin	Benj. Soule	Bath, Maine.
Kentucky Central	J. R. Ledyard	J. L. Hackathorn	Covington, Ky.
Knoxville & Charleston			Knoxville, Tenn.
Kansas Pacific	**L. H. Waugh		Wyandotte, Kansas.
Denver Pacific Div	**L. H. Waugh		Wyandotte, Kansas
Denver & Boulder Valley Div	**L. H. Waugh		Wyandotte, Kansas.
Junction City & Ft.Kearney Div	**L. H. Waugh		Wyandotte, Kansas.
Arkansas Valley Div	**L. H. Waugh.		Wyandotte, Kansas.
Kalamazoo. Allegan & Grand Rapids			Kalamazoo, Mich.
Kansas City, St. Joseph & Council Bluff	§§H. L. Cooper	H. L. Cooper	St. Joseph, Mo.
King's Mountain	E. Thomas.	E. Thomas.	Chester, S. C.
L			
Lake Erie & Louisville	John Pero.		Fremont, Ohio.
Lackawanna & Bloomsburg	Chas. Graham	Chas. Graham	Kingston, Pa.
Lehigh Valley	John I. Kinsey		South-Easton, Pa.
Lehigh Valley	P. Hofecker	E. R. Brown	Weatherly, Pa.
Lehigh Valley	A. Mitchell	Mauch Chunk, Pa.	Delano, Pa.
Lehigh Valley	D. Clark		Hazleton, Pa.
Leavenworth, Lawrence & Gal	S. M. Philbrick		Lawrence, Kansas.
Lexington & Big Sandy	Fred. Weber	R. Brainard	Ashland, Ky.
Little Rock & Fort Smith	D. R. Wing	D. R. Wing	Argenta, Ark.
Little Miami	J. H. Setchel.		Cincinnati, Ohio.
London & Port Stanley			London, C. W.
Louisville, New-Albany & Chicago	Geo. Ruhlandt	Geo. Helfrich	New-Albany, Ind.
Long Island	Chs. A. Thompson.	Ellis Dodge	Hunter's Point, L I.
Louisville, Cincinnati & Lexington	E. B. Gibbs	S. S. Pilson	Louisville, Ky.

Railroad.	*Master-Mechanic.*	*Master-Car-Builder.*	*Residence.*
Louisville & Nashville	†Thatcher Perkins		Louisville, Ky.
Louisville & Nashville	D. P. Rennie	Isaac M. Owens	Louisville, Ky.
Louisville & Nashville	Jas. Montgomery		Bowling Green, Ky.
Nashville & Decatur Division	John Skidmore		Nashville, Tenn.
South & North Ala. Div.	Thos Jeffers	W. L. Gude	Birmingham, Ala.
South & North Ala. Div	C. H. Beale		Montgomery, Ala.
Memphis & Ohio Div.	Thos. Walsh	R. M. C. Parker	Memphis, Tenn.
Lake Shore & Michigan Southern	‡James Sedgley	††John Kirby	Cleveland, Ohio
Michigan Southern Division	Geo. W. Stevens		Elkhart, Ind.
" " "		S. S. Knapp	Adrian, Mich.
Toledo Division	Geo. H. Tier	Frank O. Bray	Norwalk, Ohio.
Erie Division	L. O. Gassett	J. Withyecombe	Cleveland Ohio.
Buffalo Division	W. L. Wallace	A. Robson	Buffalo, N. Y.
Lake Shore & Tuscarawas Valley	Charles Fellows	J. D. McIlwain	Black River, Ohio.
Lake Ontario Shore	J. C. Schermerhorn	J. C. Schermerhorn	Oswego, N. Y.
M			
Marquette, Houghton & Ontonagon	A. P. Burroughs	H. D. Lyons	Marquette, Mich.
Macon & Augusta			Macon, Ga.
Maine Central	J. W. Philbrick	C. H. Kenison	Waterville, Me
Macon & Western	D. M. Gogul	James A. Knight	Macon, Ga
Manchester & Lawrence	Chas. L. Eastman	M. W. Dickerman	Concord, N. H.
Marietta & Pittsburg	W. J. Adams		Marietta, Ohio.
Maryland & Delaware	J. L. Caldwell		Easton, Md.
Macon & Brunswick	M. Thornton	M. Thornton	Macon, Ga.
Marietta & Cincinnati	E. Bosley	E. Bosley	Chillicothe, Ohio.
Memphis & Little Rock	Tho. Rennells	P. Twitchell	Argenta, Ark.
Memphis & Charleston	A. Ross	A. W. Drew	Memphis, Tenn.
Memphis & Charleston	H. N. Burford	Fabien Varin	Huntsville, Ala.
Mineral Point	Robert Hay	Robert Hay	Mineral Point, Wis.
Mississippi & Tennessee	Geo. Haszinger	J. Riny	Memphis, Tenn.
Mississippi Central	Henry Gibbon	John E. Becton	Water Valley, Miss
Maryland & Delaware	Samuel Peters		Greensboro, Md.
Mississippi, Gains. & Tus			Gainsville, Ala.
Midland Pacific			Nebraska City, Neb.
Milwaukee & Northern		W. J. F. Liddell	De Pere, Wis.
Milwaukee & St. Paul	T. S. Davis	Wm. E. Kittredge	Milwaukee, Wis.
Milwaukee & St. Paul		John Baillie	Milwaukee, Wis.
Milwaukee & St. Paul	J. Pattee	D. F. Wilson	Minneapolis, Minn.
Hastings & Dakota Division	C. C. Clements		Hastings, Minn.
Michigan Central	‡A. P. Farrar		Jackson, Mich.
Michigan Central		J. B. Sutherland	Detroit, Mich.
Grand River Valley Division		James Potts	Jackson, Mich.
Jackson, Lans'g & Saginaw Div.	Andrew Wilson	Andrew Wilson	Jackson Mich.
Montgomery & West-Point	J. McVey	J. T. Daniels	Montgomery, Ala.
Montgomery & Eufaula	I. W. Hewlet	T. J. Burton	Montgomery, Ala.
Mobile & Montgomery	James McFarland	L. Barham	Montgomery, Ala.
Mobile & Girard	C. D. Wall		Girard, Ala.
Mobile & Ohio	L. J. Fleming	John McHugh	Mobile, Ala.
	B. S. Skates	Jacob Huy	Whistler, Ala.
Morgan's Louisiana & Texas	N. Tilton	Wm. O'Brien	Algiers, La.
Missouri River, Fort Scott & Gulf	John S. McCrum		Kansas City, Mo.
Missouri River, Fort Scott & Gulf		Josiah Stahl	Wyandotte, Kan.
Missouri, Kansas & Texas		J. Townsend	Sedalia, Mo.
Missouri, Iowa & Nebraska	Wm. Adams		Alexandria, Mo.
Missouri Pacific		E. Martin	St. Louis, Mo.
N			
Nashville & Chattanooga	John U. Eastman	J. G. Sawyer	Nashville, Tenn.
New-Bedford & Taunton	Robert Chase	Robert Chase	New-Bedford, Mass.
New-Canaan			New-Canaan, Ct.
New-Brunswick & Canada	Tho. Armstrong	G. Houlton	Fredericton, N. B.
New-Haven & Northampton	Henry Fox	Henry Fox	New-Haven, Ct.
New-York, Kingston & Syracuse	A. Q. Mackenbush	G. Dikeman	Syracuse, N. Y.
New-York & Harlem	Wm. M. Strong	Leander Garey	New-York.
New-York Central & Hudson River	‡G. B. Van Vorst		Albany, N. Y.
New-York Central & Hudson River	Henry Watkeys		Syracuse, N. Y.
New-York Central & Hudson River	Amos Gould		Rochester, N. Y.
New-York Central & Hudson River	Jas. Butman	Wm. Johnson	Buffalo, N. Y.
New-York Central & Hudson River	Wm. Buchanan	John McKenna	New-York.
New-York Central & Hudson River			East-Albany, N. Y.
New-York Central & Hudson River		Joseph Jones	West-Albany, N. Y.
New-York Central & Hudson River		George Rowe	Niagara Falls, N. Y.
New-York, Boston & Montreal		H. A. Webster	Dutchess Junc., N. Y.
New-York & Oswego Midland	‖Wm. H. Griggs	Wm. H. Griggs	Oswego, N. Y.
New-Jersey Division	J. F. Sechler		Wortendyke, N. J.
New-Jersey Division		J. A. Read	Pompton, N. J.
New-York & New-England	Geo. E. Boyden	Elias E. Pratt	Boston, Mass.
New-York, Providence & Boston	Jas. H. Anderson	Jas. H. Anderson	Providence, R. I.
New-York, New-Haven & Hartford	§§H. Kittendorf	James Denver	New-Haven, Ct.
New-York, New-Haven & Hartford	J. O. Chapman	F. Leppens	Hartford, Ct.
New-Jersey Southern	Rufus Blodgett		Manchester, N. J.
New-Haven & Derby			New-Haven, Ct.
New-Lisbon			Leetonia, Ohio.
New-Orleans & Ohio	John R. Jordan	John R. Jordan	Paducah, Ky.
New-Orleans, Jackson & Gt. Northern	N. Greener	N. Greener	New-Orleans, La.
New-Haven, Hartford & Springfield			Hartford, Ct.
Naugatuck	Henry Hanford	George W. Gray	Bridgeport, Ct.
North-Carolina	Rufus D. Wade	B. G. Sergeant	Co. Shops, N. C.
North-Louisiana & Texas	C. H. Tull		Monroe, La.
New Orleans, Mobile & Texas	J. R. White	D. C. Roland	Mobile, Ala.
Northern Central	C. M. Lewis		Baltimore, Md.
Northern Central		G. W. Demarest	York, Pa.
North-Lebanon		Henry B. Oves	Lebanon, Pa.
North-Pennsylvania	Franklin Roop	Franklin Roop	Philadelphia, Pa.
North Eastern	D. W. Haines	A. M. Corrie	Florence, S. C.
Northern	James W. Lander	Albert Langmaid	Concord, N. H.
Northern of New-Jersey	T. W. Demorest		New-York.
Norwich & Worcester	Richard Colburn	G. R. Bentley	Norwich, Ct.
Northern of Canada	P. Clark.	P. Clark	Toronto, Can.
Northern Pacific	H. A. Towne		St. Paul, Minn.
Minnesota Division		W. S. Heathcote	Brainerd, Minn.
Lake Superior & Miss. Division	W. McFarland	John Hill	St. Paul, Minn.
Dakota Division	C. W. Rossiter		Fargo, D. T.
Pacific Division	J. F. Curtis		Kalama, W. T.
O			
Old Colony & Newport	J. K. Taylor	A. Gleason	Boston, Mass.
Oil City & Pithole	George Thompson		Pithole, Pa.
Oil Creek & Alleghany River	J. S. McElroy	Jacob Williams	Corry, Pa.
Oil Creek & Alleghany	H. J. Bookhammer	John Monks	Oil City, Pa.
Ohio & Mississippi		G. Hibbard	Cochran, Ind.
East Division	A. Thompson		Cochran, Ind.
West Division	H. Elliott	Chas. Hyatt	East St. Louis, Ill.
Oregon & California	§§J. Brandt.		Portland, Oregon.
Owensburg & Russellville	J. R. Osborne		Owensburg, Ky.
P			
Paducah & Memphis	J. D. Linning		Paducah, Ky.
Painesville & Youngstown	G. R. Crane		Painesville, Ohio.
Paris & Decatur	John G. Clifford	G. Clifford	Paris, Ill.
Panama	Chas. E. Stewart	J. G. Wilson	Aspinwall, N. G.
Pacific of Missouri	§§John Hewitt	John Hewitt	St Louis, Mo.
Pennsylvania	§§F. Thomson		Altoona, Pa.
Pennsylvania	H. D. Garrett	I. W. Van Houten	W. Philadelphia, Pa.
Pennsylvania	E. L. Caum	Samuel W. Myers	Harrisburg, Pa.
Pennsylvania	G. W. Strattan	John P. Levan	Altoona, Pa.
Pennsylvania	D. O. Shaver	R. S. Ramsey	Pittsburg, Pa.
New-Jersey Division	John Headden	David H. Baker	Jersey City, N. J.
West-Penn. Division	C. B. Street	James F. Elder	Blairsville, Pa.
Philadelphia and Erie	Martin Walls		Sunbury, Pa.
	W. L. Forster		Renovo, Pa.
	W. L. Holman		Kane, Pa.
	W. T. Smith.		Erie, Pa.
	§§T. N. Ely		Erie, Pa.

Railroad.	*Master-Mechanic.*	*Master-Car-Builder.*	*Residence.*
Philadelphia, Wilmington & Baltimore	S. A. Hodgman	Wm. T. Worth	Wilmington, Del.
Philadelphia & Reading	L. B. Paxson	Aaron Steinbach	Reading, Pa.
Germantown & Norris'n Div.	Jackson Richards		Philadelphia, Pa.
Philadelphia & Baltimore Central	S. D. Danfield	Samuel D. Danfield	Chester, Pa.
Pittsburgh, Cincinnati & St. Louis			
Pittsburgh & Columbus Division	E. Pierce		Dennison, Ohio.
Pittsburgh & Columbus Division		James McGee	Steubenville, Ohio.
Little Miami Division		M. P. Ford	Columbus, Ohio.
Little Miami Division	J. H. Setchel		Pendleton. Ohio.
Col., Cin. & Ind. Division	Robert Curtis	Tho. Chamberlain	Columbus, Ohio.
Col., Cin. & Ind. Division	Geo. H. Prescott	Geo. H. Prescott	Logansport, Ind.
Peoria & Rock Island	Geo. Gregg		Peoria, Ill.
Pittsburg & Connellsville	J. M. Leech	J. E. Gamsel	Pittsburg, Pa.
Pittsburg, Fort Wayne & Chicago	S. M. Cummings	John Marquis	Allegheny, Pa.
Pittsburg, Fort Wayne & Chicago	J. M. Boon	Israel Lee	Fort Wayne, Ind.
Pittsburg, Fort Wayne & Chicago		J. J. Kirkland	Crestline, Ohio.
Pittsburg, Washington & Baltimore	A. S. Kinsey		Pittsburg, Pa.
Peoria, Pekin & Jacksonville	R. F. Hurd	Jas. J. Doyl	Pekin, Ill.
Peninsular	T. G. Templeton		Battle Creek, Mich.
Portland & Rochester	John G. Brady	John G. Brady	Portland, Me.
Portland & Kennebec	John Ellis	C. H. Kenison	Augusta. Me.
Portland & Oxford Central	Geo. W. Battles	Geo. W. Battles	Buckfield, Me.
Portland, Saco & Portsmouth	John Donnell		Portland. Me.
Port Royal	C. W. Furber	E. Hubard	Port Royal, S. C.
Port Hope, Lindsay & Beaverton	H. G. Taylor	H. G. Taylor	Port Hope, Can.
Port Huron & Lake Michigan	R. C. Stewart	R. C. Stewart	Port Huron, Mich.
Providence, Warren & Bristol	Rufus Smith	J. Brightman	Bristol, R. I.
Portsmouth, Gt. Falls & Monmouth	James Tucker	E. Fall	Union Village N H.
Petersburg & Weldon	R. B. Andrews	Alex. Wright	Petersburg, Va.
Providence & Worcester	Joseph Kelly	Olney L. Smith	Providence, R. I.
Poughkeepsie & Eastern	John L. Driscoll	Jerry Wigg	Poughkeepsie, N. Y
Q			
Quincy, Missouri & Pacific	Geo. Adams		Quincy, Ill.
R			
Raleigh & Gaston	J. B. Gayle	J. B. Gayle	Raleigh, N. C.
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Reading & Columbia	B. Van Lew		Columbia, Pa.
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Rochester & Genesee Valley	M. E. Brown	M. Wilder	Buffalo, N. Y.
Rockford, Rock Island & St. Louis	Joseph Elder	T. F. Nolte	Beardstown, Ill.
S			
Saginaw Valley & St. Louis	W. S. Thompson		Saginaw, Mich.
Southern Pacific of California	J. P. Wilson	F. N. Bellisle	San Francisco, Cal.
St. Croix & Lake Superior			New-York City.
St. Croix & Penobscot	Edward Bolton	A G. Page	Milltown, Me.
St. Lawrence & Ottawa	Calvin Dame	Calvin Dame	Prescott, Canada.
St. Louis & Iron Mountain	O. A. Haynes	Oscar Doolittle	Carondelet, Mo.
St. Joseph & Denver City	E. Sleppy		St. Joseph, Mo.
San Antonio & Mexican Gulf	W. T. Bingham		Victoria, Texas.
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St. Paul & Sioux City	F. C. Butterfield	J. W. Lydic	Shakopee, Minn.
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Indianapolis Division	Wm. Riley		Terre Haute, Ind.
Vandalia Division	A. J. Sanborn.		Effingham, Ind.
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Southern Central	Chas. G. Brown	H. Mooney	Auburn, N. Y.
Southern Minnesota	—— Waters		Wells, Minn.
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South-Western of Georgia	D. M. Gogul	James A. Knight	Macon, Ga.
South Shore	Warren E. Ray		Cohasset, Mass.
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Stonington & Providence	J. H. Anderson	J. H. Anderson	Providence, R. I.
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Selma, Rome & Dalton	A. G. Maynes	W W. Peirce	Selma, Ala.
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T			
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Tennessee & Pacific	William McKeand	William McKeand	Nashville, Tenn.
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Toledo, Wabash & Western		David Hoit	Toledo. Ohio.
Toledo, Wabash & Western	T. G. Gorman		Springfield, Ill.
Toledo, Peoria & Warsaw	W. O. Hewitt	R. M. Hemphill	Peoria, Ill.
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Toronto & Nipissing	J. Haggus		Toronto, Canada.
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Utah Central	Thos. Pierpont	Edward Cox	Salt Lake City.
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Utica, Chenango & Susquehanna	C. H. Brown		Utica, N. Y.
V			
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Wicomico & Pocomoke			Berlin, Md.
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Wilmington & Weldon	John Bissit	John Bissit	Wilmington, N. C.
Wilmington & Western			Wilmington, Del.
Wilmington & Reading		Jas. F. Van Horn	Coatesville, Pa.
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Concord	H. E. Chamberlin	H. E. Chamberlin	Concord, N. H.
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Connecticut Valley	Hiram Fowler		Hartford, Ct.
Connecticut Western	W. H. Yeomans		Hartford, Ct.
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Cumberland Valley	I. F. Boyd	I. F. Boyd	Chambersburg, Pa.
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Fort Wayne, Muncie & Cin	W. W. Worthington		Fort Wayne, Ind.
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Grand Rapids & Indiana		William Mullins	Pittsburg, Pa.
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West Division	W. J. Spicer		
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Indianapolis & Vincennes	E. W. McKenna		Indianapolis, Ind.
Indianapolis & Vincennes		Wm. Mullins	Pittsburg, Pa.
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Kansas Pacific		J. L. Woods	St. Louis, Mo.
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Smoky Hill Division	O. H. Dorrance		Ellis, Kansas.
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	L. Chamberlin		Philadelphia, Pa.
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Mahony Division	James I. Blakslee		Mauch Chunk, Pa
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Louisville & Nashville & G. Southern	Albert Fink	G. C. Breed	Louisville, Ky.
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(See Page 253.)

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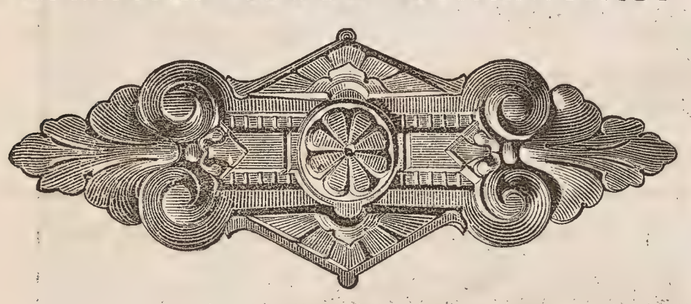

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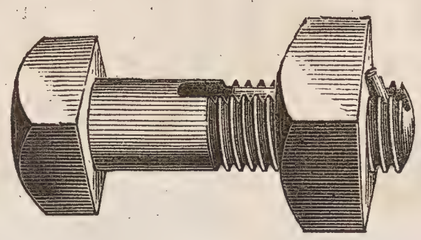
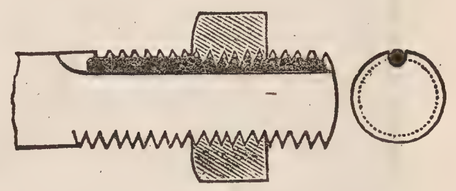


"CUMMING NUT-LOCK,"
Patented
June 16, 1868,
August 23, 1870.



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This simple device, as will be seen by the engravings, consists of a groove being cut in the threaded part of a screw bolt into which is placed a key of copper wire, or other soft metal; when the nut is screwed on, it cuts a thread on the key, thereby making it impossible for the key to get out until the nut is taken off. When the nut is screwed up to its place, that part of the key over which the nut has passed is riveted up against the nut with a small punch, destroying the thread on the key. The nut, therefore, can not move backward until force is used, as with a wrench.

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Experience has proved this device absolutely reliable, and it is the cheapest of all known devices for the purpose. By its use, old bolts on which the nuts have become too slack for use can be made as good as new, making it a great saving to railroad companies and others in that item alone. It is cheaper than a check-nut.

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This is the only method in use that locks the nut firmly to the bolt without regard to place or surroundings, all others require some attachment that holds the bolt in its position, and a washer or other attachment to keep the nut from turning.

DIRECTIONS FOR USE.—Place the copper key in the slot, pointed end out, and beveled side up, in such a position that when the nut is screwed to its place about three-eighths of an inch of the key will project beyond its outer face. Then screw the nut to its place *over the key*, allowing it to cut its own thread in the copper. Then take a narrow flat set punch, and rivet the projecting part of the key *solidly* against the outer face of the nut. To tighten the nut: screw it up, and rivet the key tighter. To remove the nut: simply apply the wrench and unscrew the nut. It will cut its own way out through the copper. The same key can be used several times, by moving it outward a few threads in the slot.

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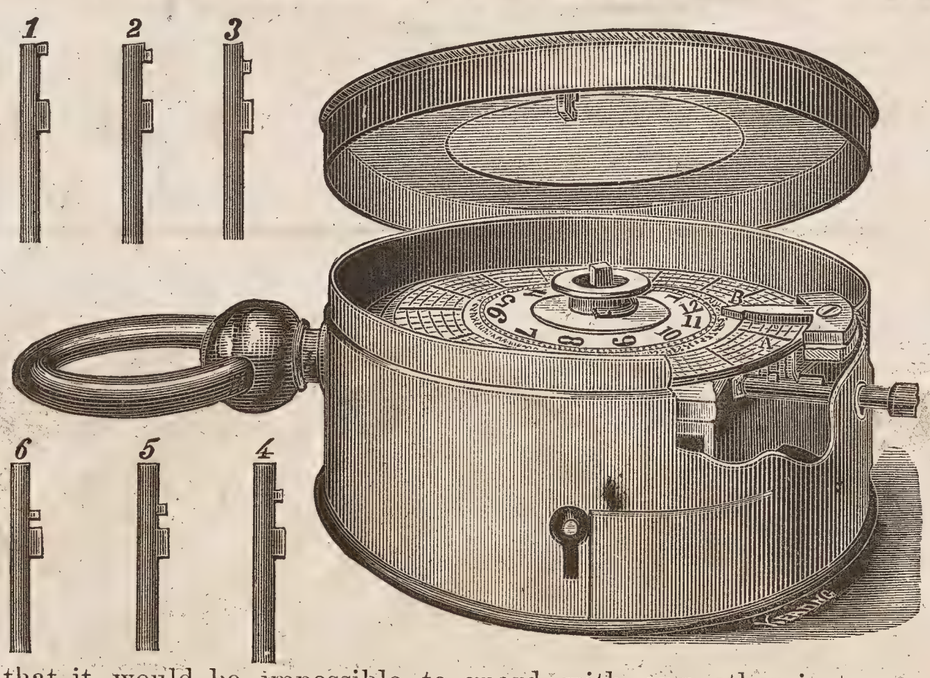

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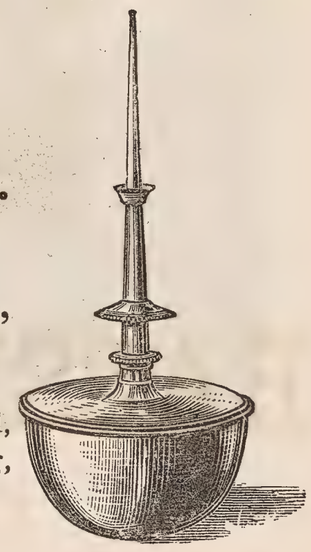

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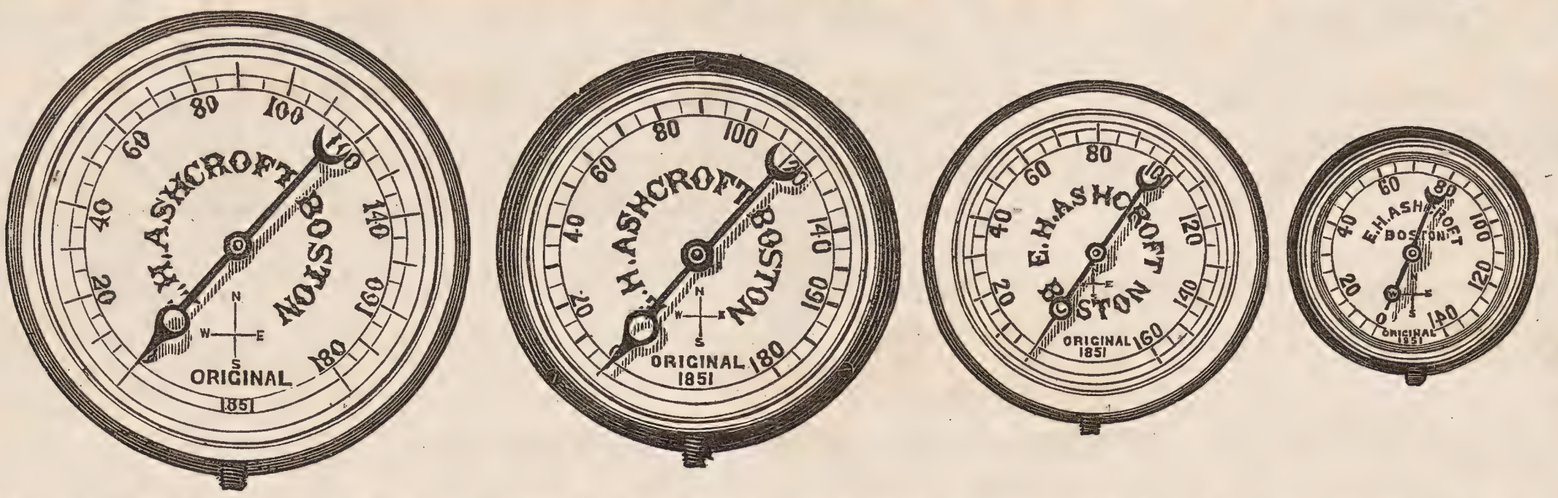

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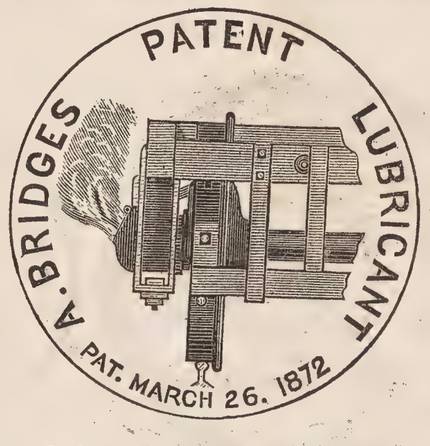

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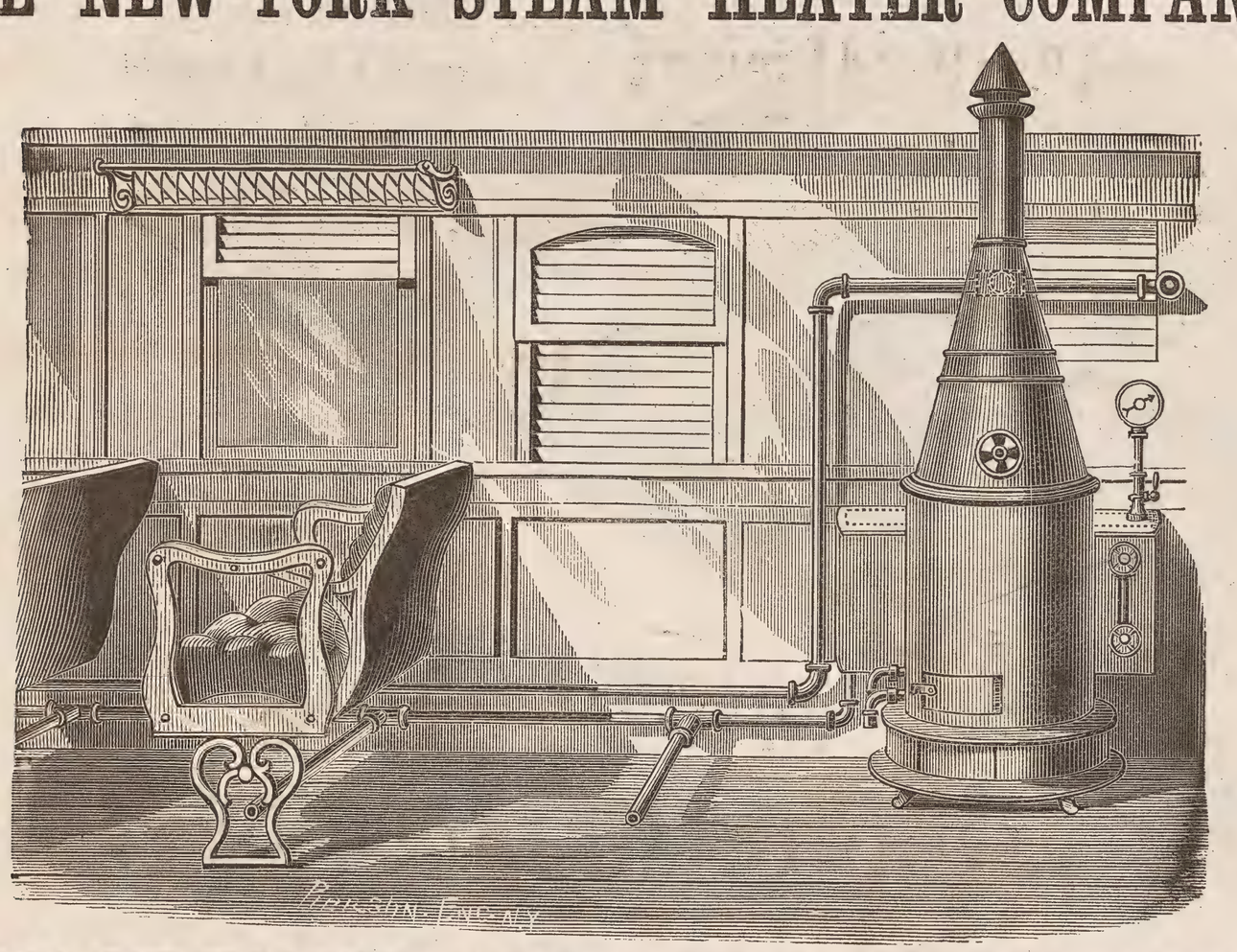

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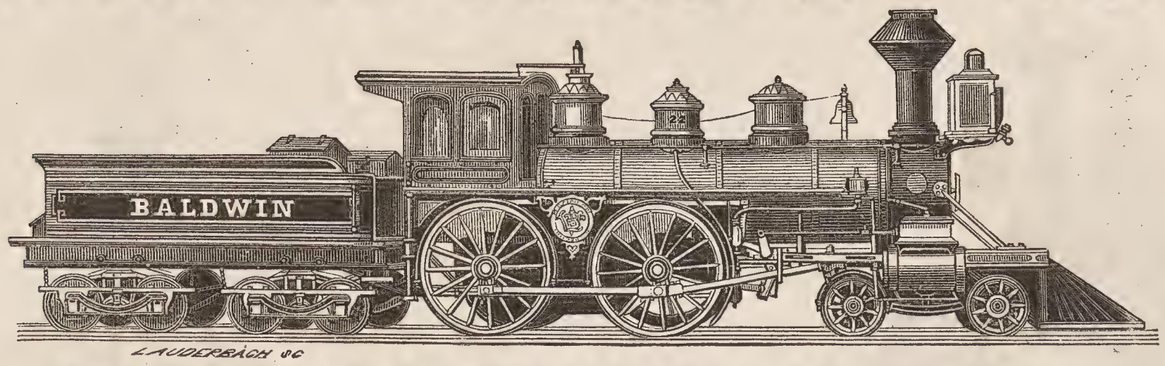

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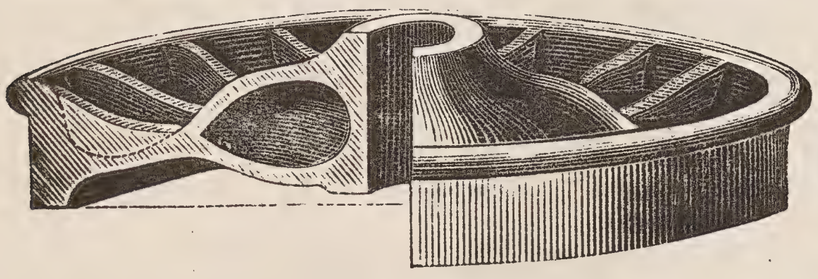

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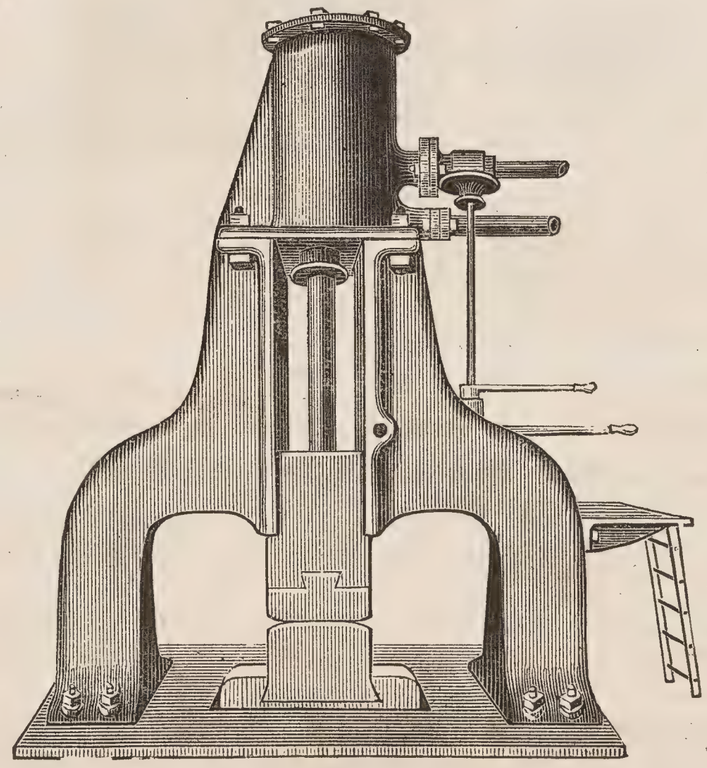

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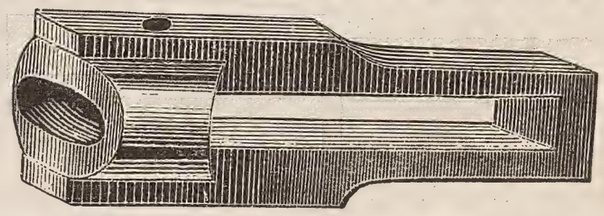

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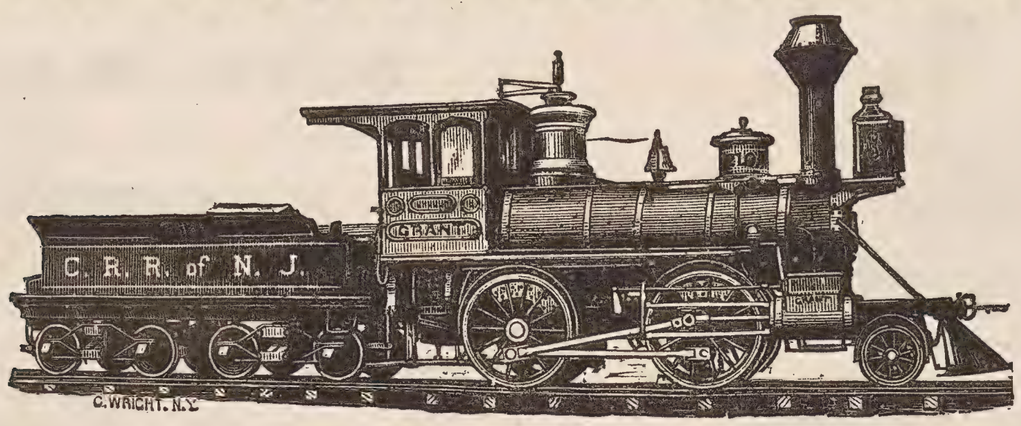

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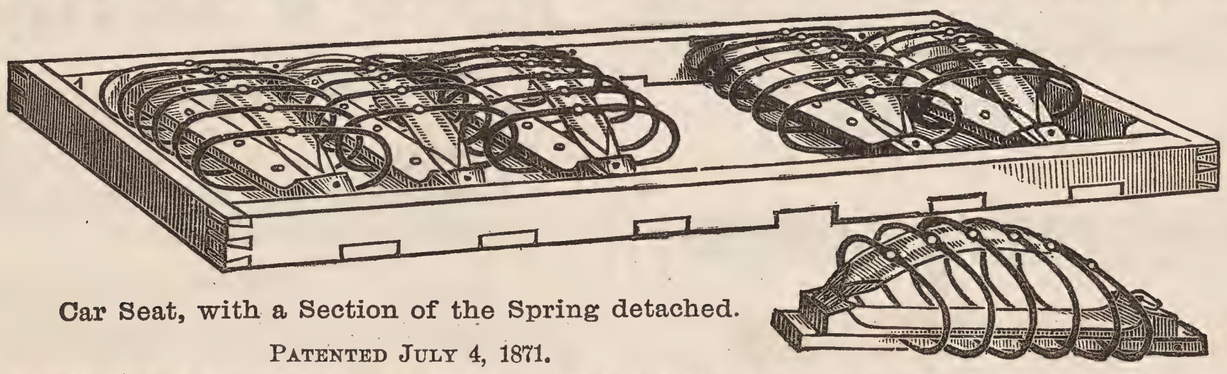

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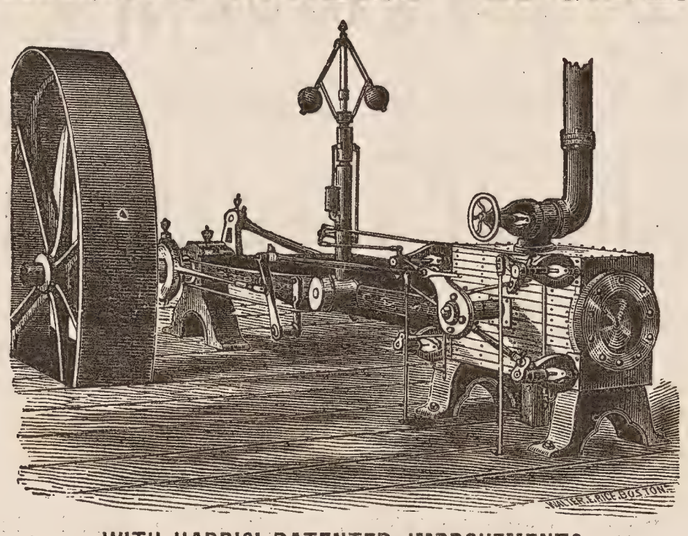

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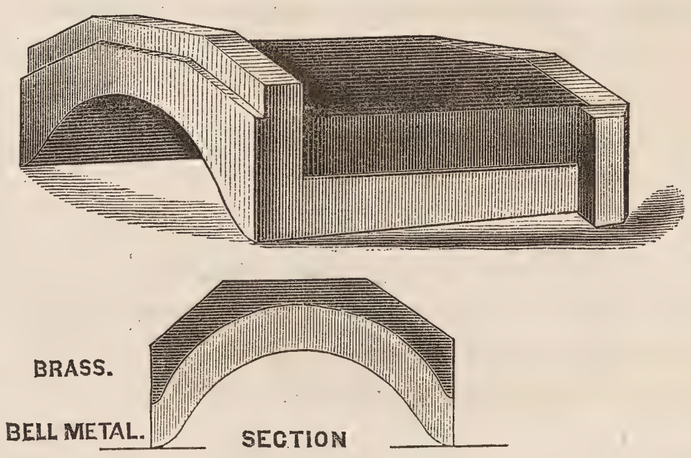

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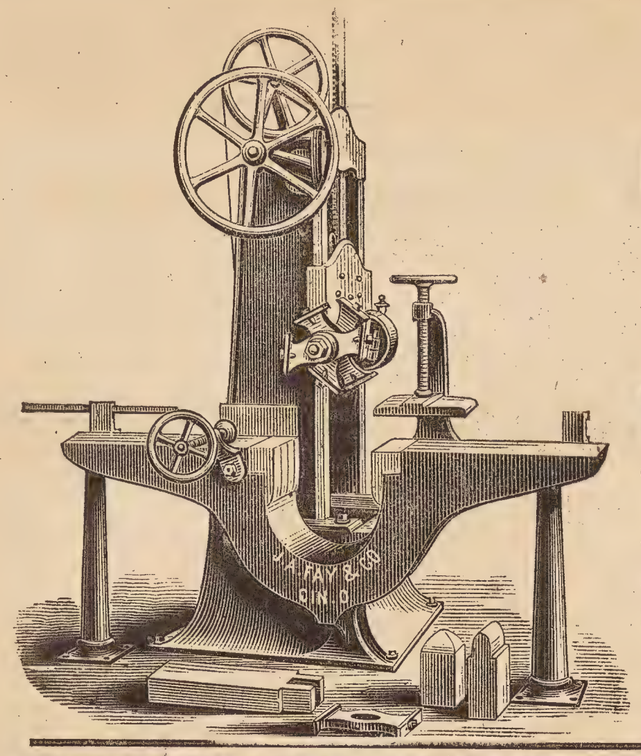

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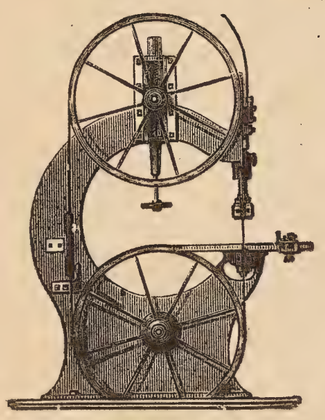

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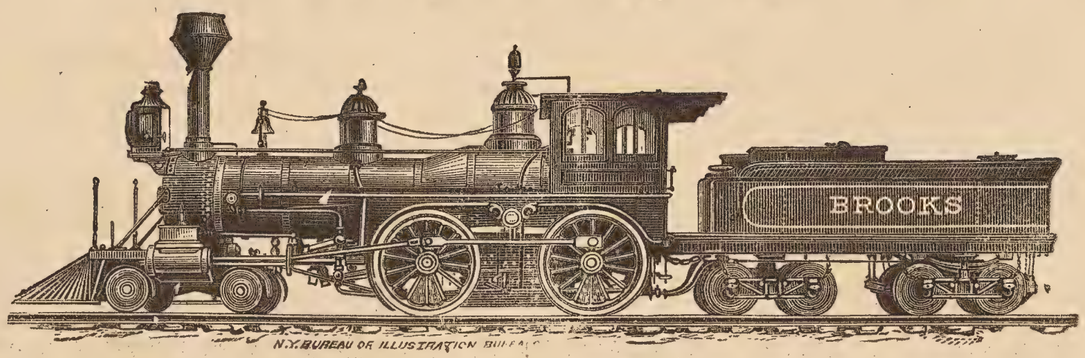

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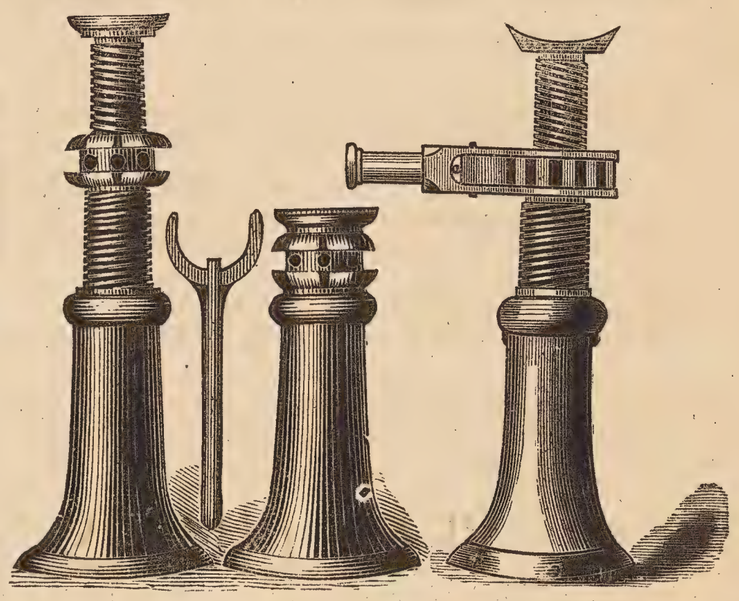

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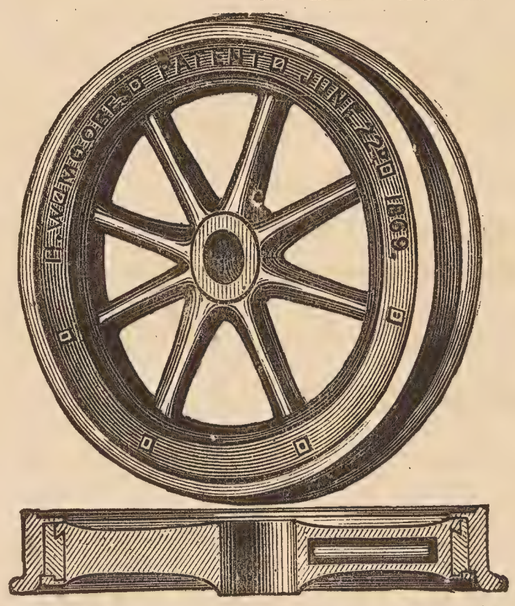

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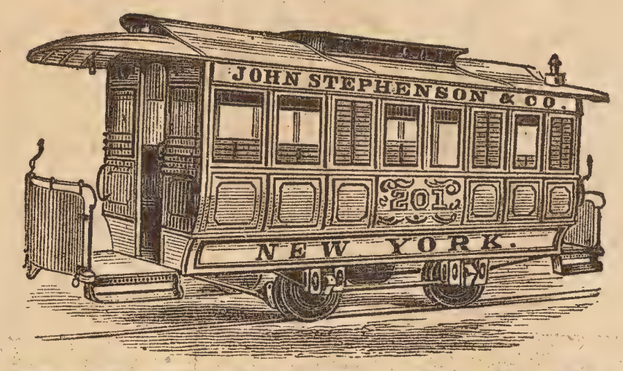

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Tool, Drill, Frog Plates and Points, Cutlery, Rake, Axe, Hoe, Machinery, Spring, Wagon-Axle, Tire, Sword, Bayonet, Rifle, and Pistol, MADE TO ORDER.

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Cold drafts around car windows and doors in Winter **ENTIRELY EXCLUDED;** also, **Dust** and **Cinders** in Summer by **BROWNE'S** Metallic **RUBBER** Window and Door Bands. Stood the test **10 YEARS** on Drawing-Room and Sleeping Cars in the United States and Europe.

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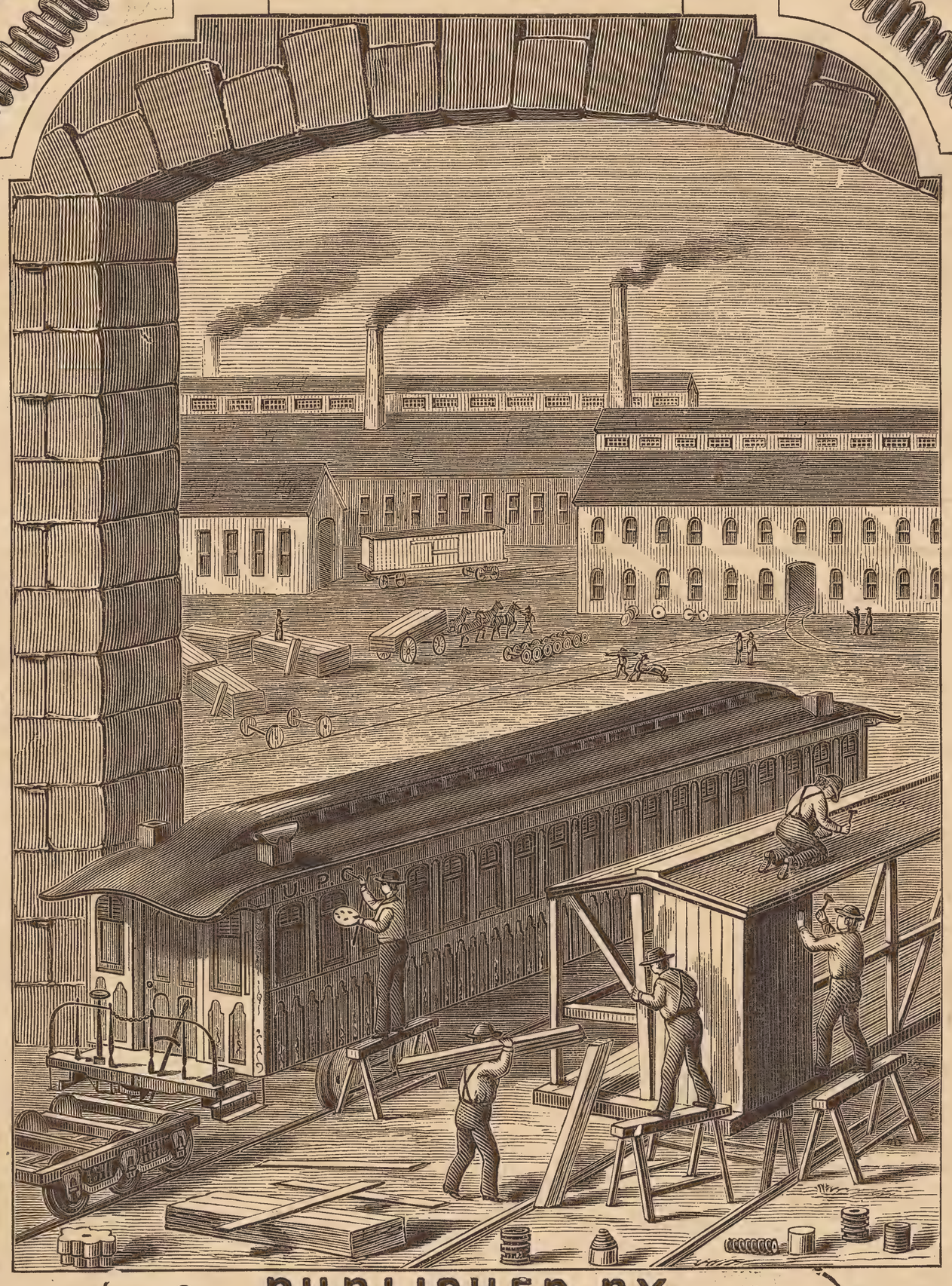
Vol. IV. NOVEMBER, 1873. No. 11.



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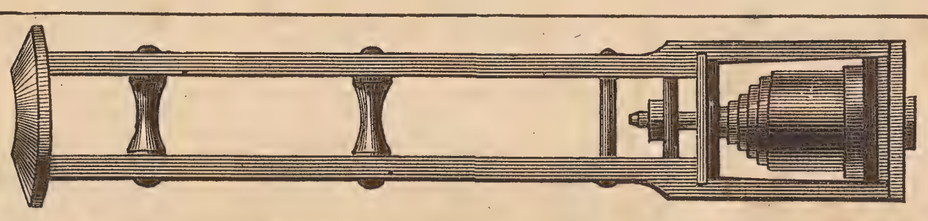

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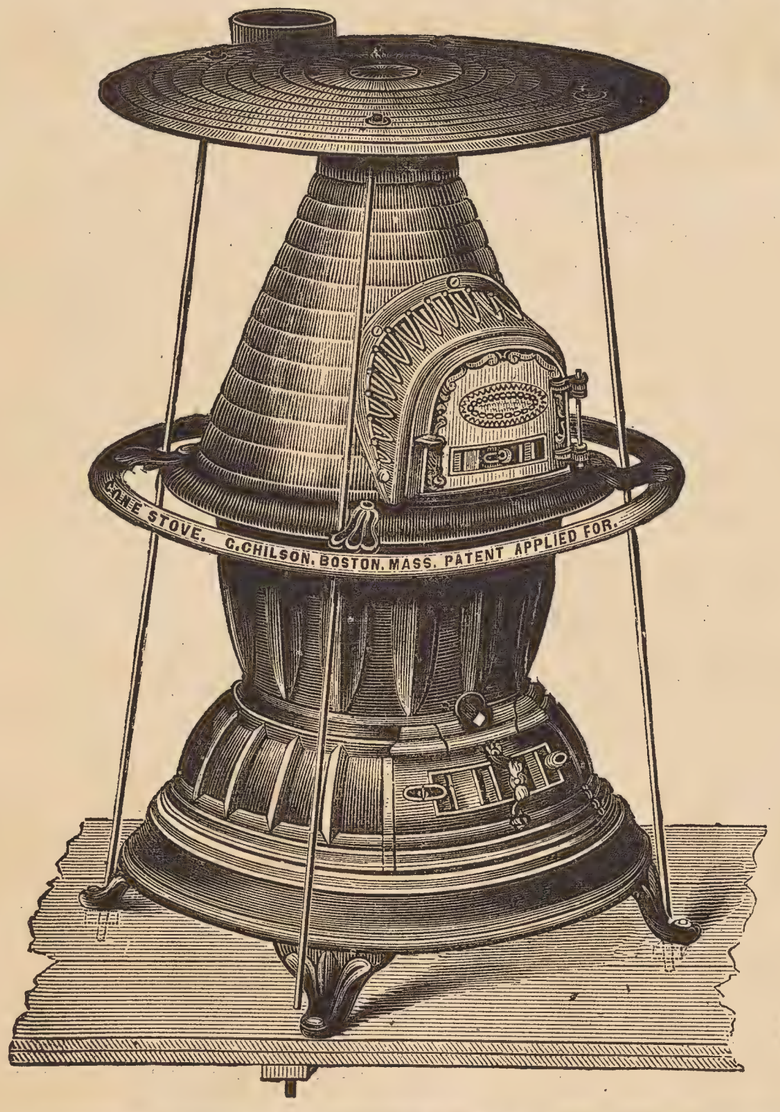
A NEW RAILWAY CAR STOVE.

Chilson's Patent Cone Disk Stove

ON A NEW AND MODEL PLAN.



I WOULD respectfully call the attention of Railway Managers and others interested in warming Railway Cars, Station Houses, etc., to this Stove, which has been thoroughly tested on several of our railways for a few years past, and has proved in every instance the most successful plan yet devised for thoroughly warming Railway Cars. This Stove is on a new and model plan, differing in principle and operation from all others in the United States. I claim for it *Safety*, *Economy*, *Durability*, *Simplicity*, *Cleanliness, and Beauty of Design*. Its peculiar merits may be stated as follows:

1. The conical radiator holds the hot smoke and gases back near the fire until they are thoroughly consumed, and the heat is rapidly radiated from the tapering surface of the cone.

2. The broad radiating disk prevents the heat from ascending to the upper part of the car or room, but distributes and throws it down to the floor, thoroughly warming the lower currents of cold air in the car or room for a great distance around the Stove, thus securing the long desired object of making the *lower part of the car and floor comfortably warm, especially for the feet.*

3. It is constructed in the most substantial and durable manner, from a new and beautiful design, wholly of *cast iron*, hence is not subject to the repairs of common stoves.

4. It is perfectly *safe*, being well secured against *accidental fires by being bolted down to the floor and having locks on the doors, so that in case a car should be overturned, fire could not get out of the Stove.* The guard rail which supports the feet when warming them, also serves as a fender, preventing the clothing from coming in contact with the Stove.

5. There is no hearth for dirt, filth, and tobacco spittle to accumulate on, which insures *cleanliness around the Stove.*

6. This Stove keeps the fire for a long time, and although adapted for coal, yet wood can be burned in it equally well.

It will be highly appreciated by all in want of a superior heater for *Factories*, *Stores*, *Offices*, RAILROAD CARS, and STATION HOUSES, *School Rooms*, *Workshops*, *etc.*, and has especially proved itself to be the most successful plan yet devised for warming RAILROAD CARS.

The BOSTON AND PROVIDENCE RAILROAD COMPANY have over two hundred of these Stoves in use, and the BOSTON AND ALBANY and several other Roads are adopting them, with the most perfect success.

BOSTON AND PROVIDENCE RAILROAD CORPORATION,
Superintendent's Office, Boston, April, 1873.

GARDNER CHILSON, Esq.: *Dear Sir:* We have about two hundred of your new "Cone" Disk Stoves in use, (a part of them for nearly five years,) for warming Passenger Cars and Stations. I can truly say that they have given entire satisfaction. These Stoves possess many important advantages over any other we have ever used, viz.: for warming the floor and displacing the cold air in the lower part of the car, whereby they are rendered much more comfortable, especially for the feet, than by any other plan known to us. The Stove is more economical in the consumption of fuel, more substantial in construction, and consequently requiring less repairs than any other in use, and so securely constructed as to prevent fire from getting out of the stove even should the car be *overturned*. I cheerfully give my testimony in favor of this Stove, and commend it to all Railroad Managers.

Yours, etc., A. A. FOLSOM, *Superintendent.*

Numerous other testimonials received from Railroads and other persons having these Stoves in use in Halls, Stores, etc., may be seen at office. Bolts are not required except for Cars and Steamboats.

Chilson's Improved Celebrated Cone Furnaces, for setting in Brickwork or in Portable Casings, Chilson's Unrivaled Double-Oven Brick Cooking-Range; Chilson's New and Splendid Arlington Portable Range; Chilson's very Superior Arlington Cooking Stove; Parlor, Office, and Store Stoves, Parlor Grates, Registers, Ventilators, etc.

Special attention given to putting up Furnaces and Ranges, and the ventilation of buildings in any part of the country.
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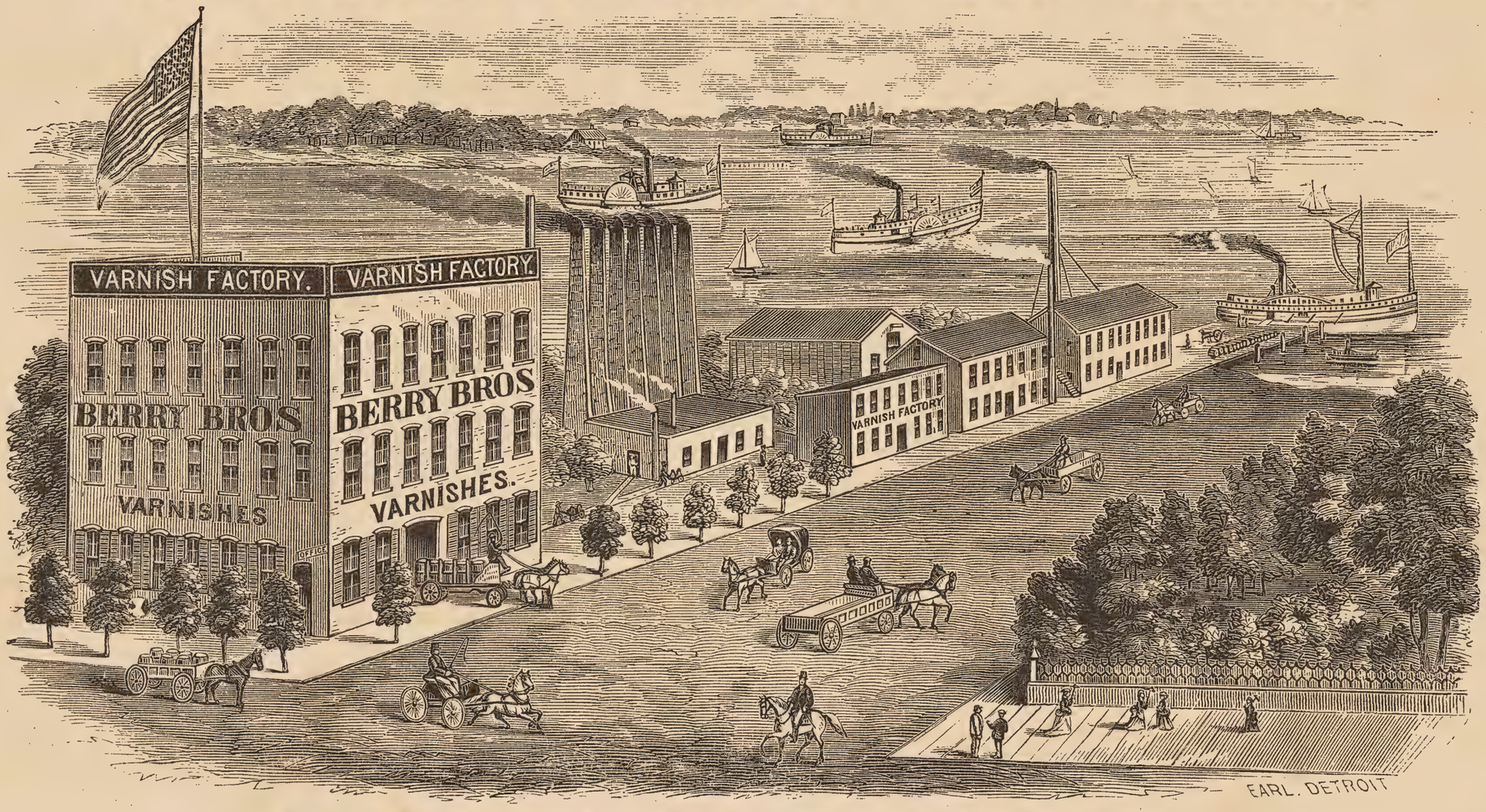

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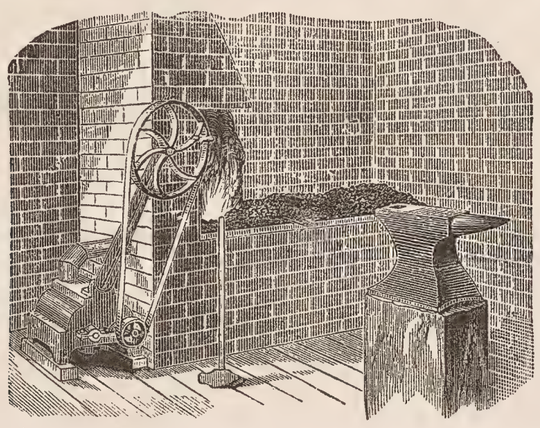
PATENT ROTARY HAND-BLOWER,



For Carriage Makers, Blacksmiths, and General Forging,

Can be operated by hand or power, and now used by many Railroads throughout the country, of which we name a few—namely, Camden and Amboy Railroad, Central Railroad of New-Jersey; Long Island Railroad; Staten Island Railroad; Belvidere Delaware Railroad; Vermont Central Railroad; Catasauqua and Fogelsville Railroad.

The advantages of this Blower over the old leather bellows, are:

GREATER DURABILITY.

Being made of Iron, it will outlast many pairs of leather Bellows.

GREATER ADAPTABILITY.

It gives a Force Blast that can be raised instantly from the slightest breath to the strongest blast.

GREATER DISPATCH OF WORK.

It heats much more rapidly than the Bellows, and is every instant under absolute control.

GREATER ECONOMY.

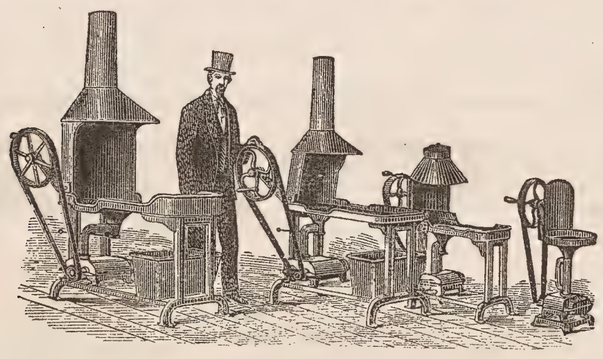
By producing a more perfect combustion, it saves a large amount of fuel, besides it occupies but a very limited space, and it ventilates the shop much better than bellows, as it takes the air from near the floor, the natural stratum of foul air.

Thus it saves *coal*, *time*, *space*, and preserves the *health*. No. 1 Blacksmith Hand-Blower will furnish ample blast for one large fire by hand or two by power.

ALSO

Patent Improved Portable Forge,

THE BEST IN THE MARKET.

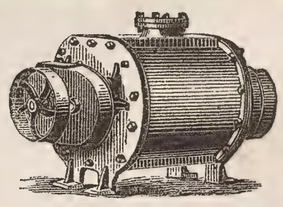


Can be operated either by hand or power, and now used by many Railroads—namely, Indianapolis and St. Louis Railroad; Lehigh Valley Railroad; Central Railroad of New-Jersey; Pittsburgh and Connellsville Railroad; Camden and Amboy Railroad and Ferry Co.; Boston, Hartford, and Erie Railroad; Raleigh and Gaston Railroad, and many others.

The Forge is compact, durable, reliable, convenient, easily moved, and yet has great heating capacity, as the blast is furnished by our Blower, making it in fact the best Portable Forge in existence.

P. H. & F. M. ROOTS ALSO MANUFACTURE

PATENT FORCE-BLAST ROTARY BLOWERS

OF ALL  SIZES,

For Foundries, Blacksmiths' Shops, Rolling Mills, and for Ventilating Public Buildings, Mines, Tunnels, etc.

The Hudson Railroad Co., Indianapolis and Cincinnati Railroad Co., Hanover Branch Railroad Co., Albany and Susquehanna Railroad Co., and Chicago, Burlington and Quincy Railroad Co. have them in use.

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ESTABLISHED 1849.

JOHN J. REID,

Manufacturer of fine Coach, Car and other

VARNISHES,

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The above having been a regularly apprenticed and trained coach painter, and perfectly familiar with the difficulties and vexations of the Varnishing department of the craft, has, with the aid of his experience as a painter, and assiduous application as a Varnish Manufacturer, succeeded in producing a RUBBING Varnish, in which is combined *all* the requisites for the expeditious and perfect surfacing of work.

Also a WEARING BODY Varnish, which, for lustre and durability, stands unrivaled, after the severest trials, by any of FOREIGN or American manufacture.

Prices always as low as the use of the best materials, skillful workmanship, and proper age will admit of.

☞ **We ask for a trial of these articles because we have** EARNED **the right to do so.**

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EDWARD SMITH & CO.,

MANUFACTURERS OF

VARNISHES

AND SOLE AGENTS FOR

POST'S COACH COLORS,

161 William Street,

EDWARD SMITH.
JOHN A. ELMENDORF.

NEW YORK.

THE

PETERSBURG CAR COMPANY,

Petersburg, Va.,

ARE NOW READY TO RECEIVE ORDERS FOR ALL KINDS OF

FREIGHT CARS.

These works are supplied with the most improved machinery, and have switch connections with broad and narrow gauge. They are prepared to furnish Rolling Stock with the utmost promptness, of the best materials and workmanship, and at the lowest prices.

T. L. H. YOUNG, President. JOHN W. FLEMING, Superintendent.

M. NIVER'S

POLISHING FLUID,

For Cleansing and Polishing

GOLD, SILVER,

PLATED WARE,

AND ALL FINE

Metallic Surfaces,

MIRRORS,

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PLATE GLASS.

Manufactured by the

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COMPANY,

AT

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AGENTS,

32 Warren St., N. Y.

Warranted Chemically Pure, and free from Mercury, Acid, Alkali, Ammonia and Grit, and not to injure or mar the finest surface, hands, or clothing.

FULLER, LORD & CO.,

Machine-Forged Nuts.

BOLTS and NUTS,

WROUGHT WASHERS,

BOONTON CUT NAILS,

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LOCOMOTIVE AND MACHINE WORKS.

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MANUFACTURERS OF

LOCOMOTIVES.

Narrow Gauge Locomotives a Specialty.

OFFICE AND WORKS

AT CONNELLSVILLE, PENN.

Hitchcock Car Ventilator.

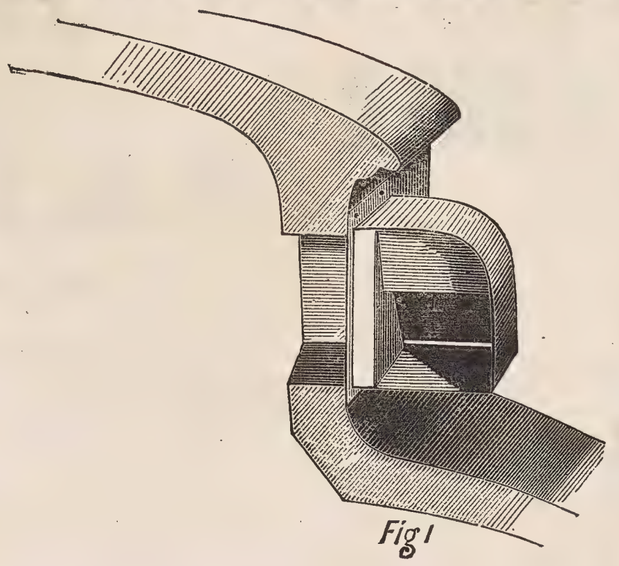

Fig 1

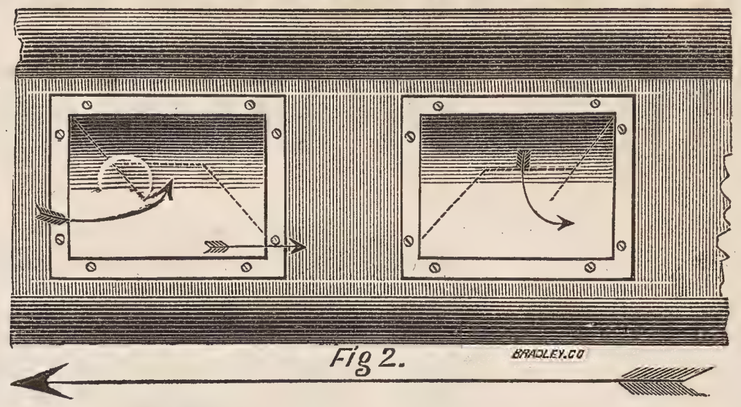

Fig 2.

THE Ventilators are placed as usual in the car roof as shown in Fig. 1, their mouths facing alternately in opposite directions, those facing forward admitting the air, and those facing backward affording an exit. Fig. 2 represents a side section of the raised roof with two of the ventilators alternately arranged. When the car is moving in the direction indicated by the arrow, it will be seen, by the curved darts, that there is an ingress and egress of air constantly taking place. The operation of the ventilators is reversed with precisely the same effect, when the car moves in the opposite direction. The internal structure is such that the dust and cinders passing into the mouth of the ventilator are intercepted by striking against two shields, shown in Fig. 1, and indicated by dotted lines in Fig. 2, and are thus naturally thrown to the bottom, where they are carried out through a small opening as shown in Fig. 1, and by the straight dart in Fig. 2, a current of pure air being forced into the car at the same time through a lateral opening. The faster the car moves, the greater is the quantity of air admitted and expelled, thus securing a free circulation which does not subject the occupants to a direct current or draught. The ventilator is also noiseless in its operation. There is no clattering of valves, and no change is necessary when the car reaches its destination. Once put in place, it is always in readiness, and runs itself independent of all employees.

H. D. CARROLL & CO., Springfield, Mass.,

Proprietors and Manufacturers.

ROBERT HITCHCOCK, Inventor.

MILLER'S TRUSSED PLATFORMS. Compresssion Buffers and Automatic Couplers for Railroad Passenger Cars.

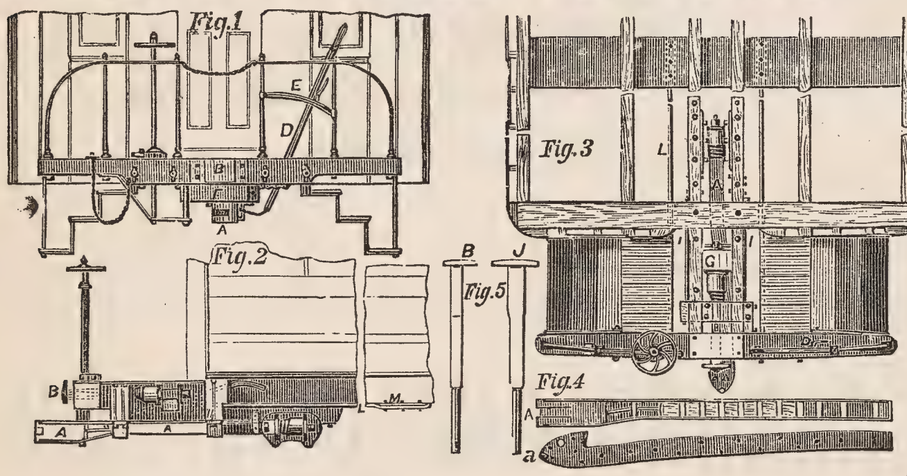

Fig.1

Fig.2

Fig.3

Fig.4

Fig.5

Office, 231 Broadway, (Rooms 4 and 5,) New-York.

Send for Illustrated Pamphlet, and call and see working models. E. MILLER, Patentee.

DESCRIPTION.

Figure 1 is an elevation; Figure 2, a longitudinal section; Figure 3, a plan of an end of a car to which the arrangement has been applied; and Figures 4 and 5 show top and side views of the "Hook" and "Buffer," drawn on a larger scale than that of Figures 1, 2, and 3.

The letters refer to the same parts in all the figures. A is the coupling "Hook," B the "Buffer," C the "Stop," D the "Lever," E the "Quadrant Ratchet," F the "Truss Beam," G the "Spring Beam," H the "Suspender Beam," I the "Upward Trusses," K the "Main Spring," L the "Downward Trusses," and M the "Bolster."

The Platforms, instead of being located below the centre line of the main sills of the cars, are placed *in* that line and held there by the Trusses I and L, so that the point of contact (in Buffers B) is *in* the said centre line and *not below* it.

The coupling "Hook" A is attached to the draw spring the same as the ordinary draw head, and at the same height above the track, but in such a manner that the outer end is free to move laterally for a short distance. The Coupling Hook projects beyond the platform. The Stop C is placed under the Buffer Beam to prevent accidental uncoupling. When two cars are brought together, the Coupling Hooks, from *their shape*, push each other aside, until the Buffers B are compressed hard on the Buffer Springs, then—*the points of the hooks having passed each other sufficiently far*—the Hooks are carried forward by their main-springs, and thus the "*Coupling*" and "*Compression*" are both effected automatically *and at the same time*, and without the use of links and pins. When two cars are thus coupled together, the *head* of the *Hook* of each car is under the Buffer Beam of its opposite car, and the platforms are close together, (about 4 inches apart.) The effect of this is, *one platform can not be forced over the other*, nor can a *child* fall between the platforms; the dust and rain are nearly all shut out; the "Compression" makes the train run steadily, and prevents all jerking at starting and stopping.

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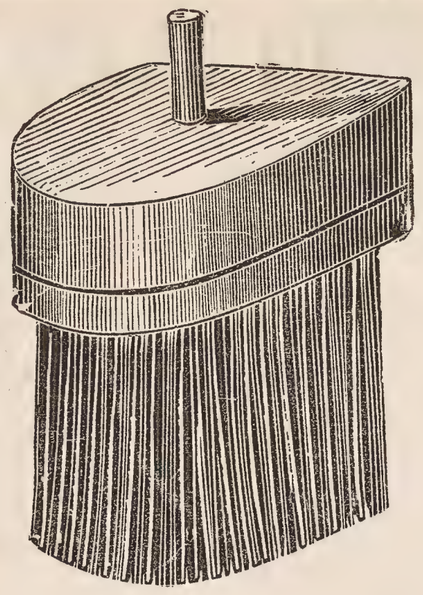

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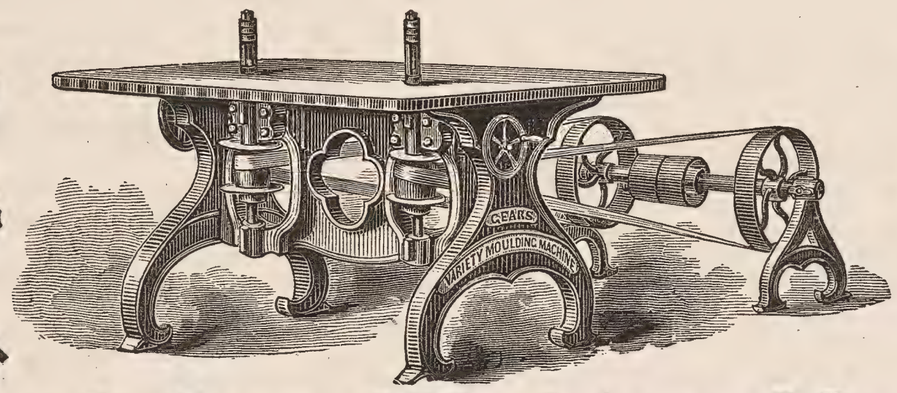

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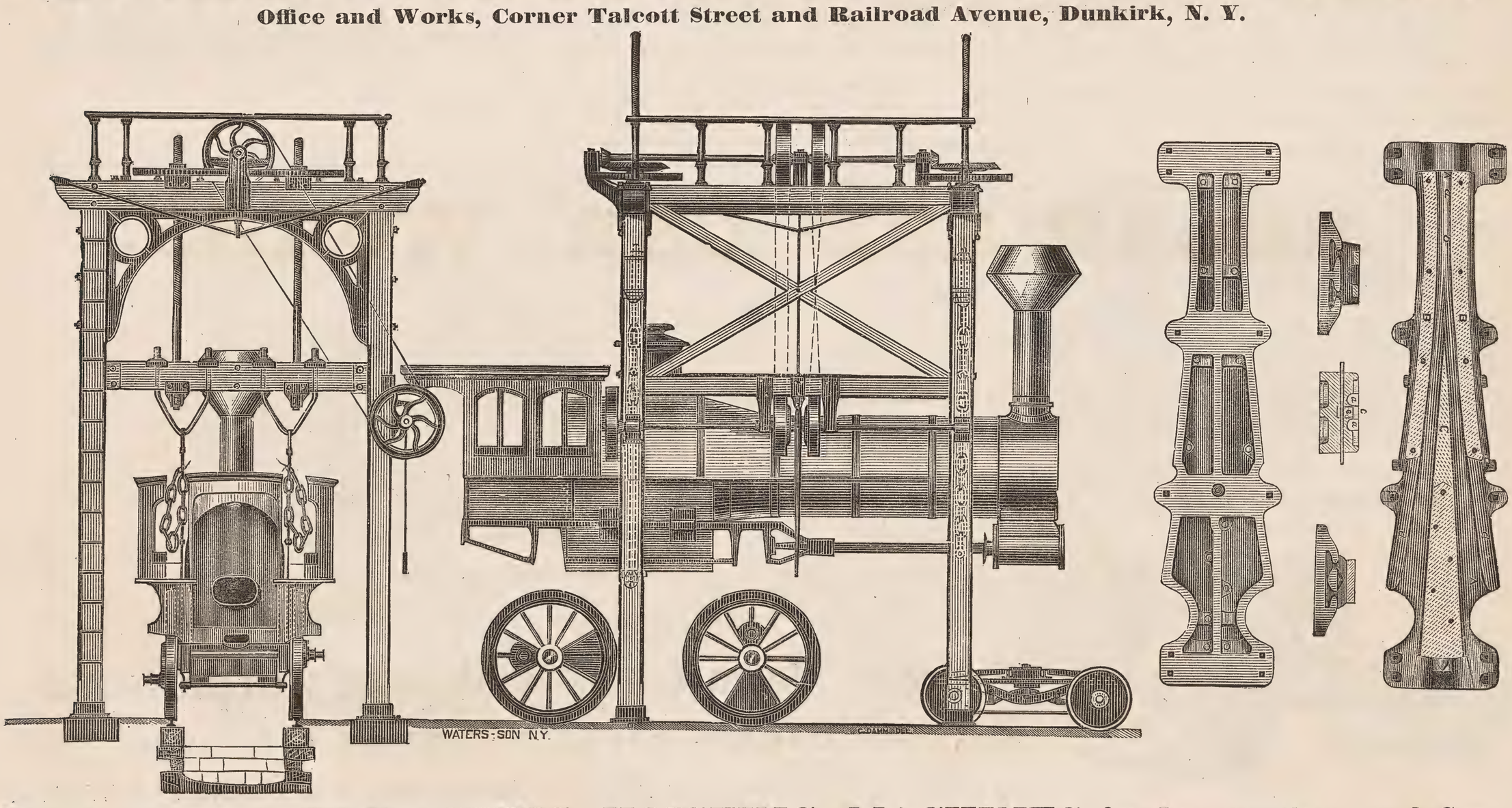

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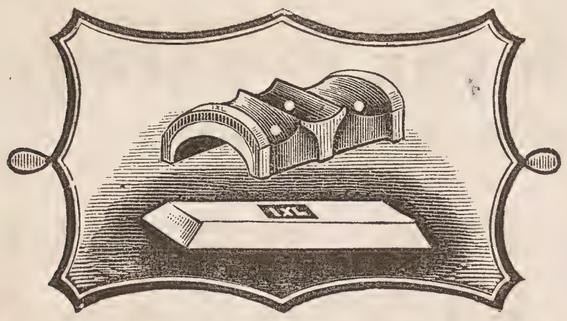

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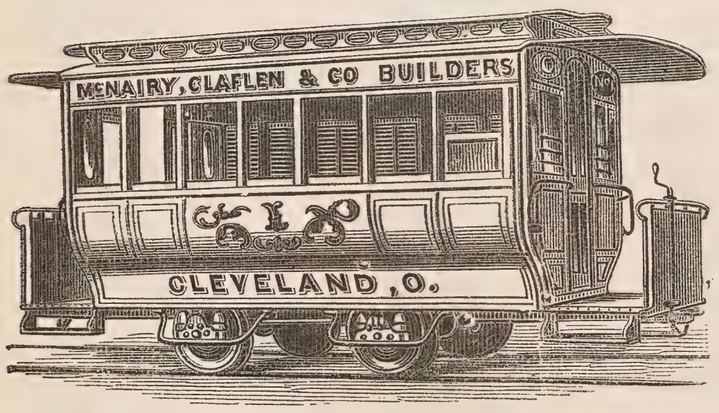

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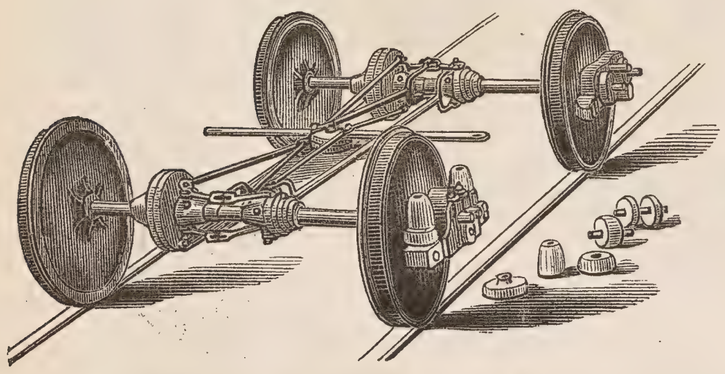

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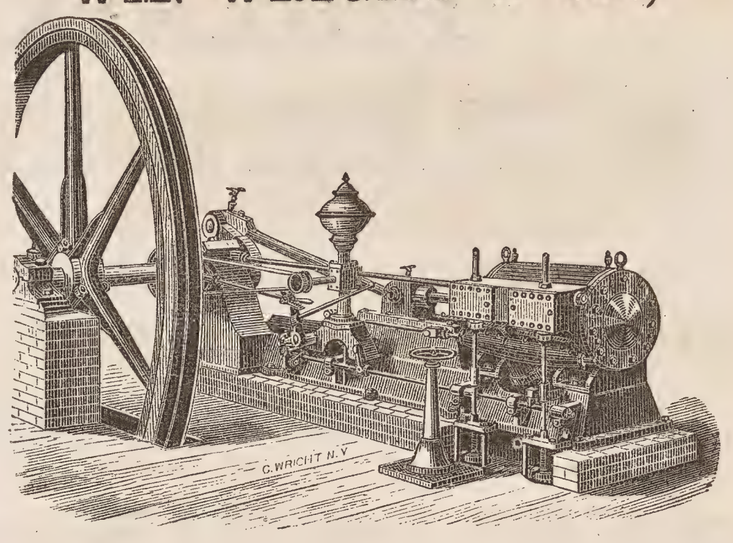

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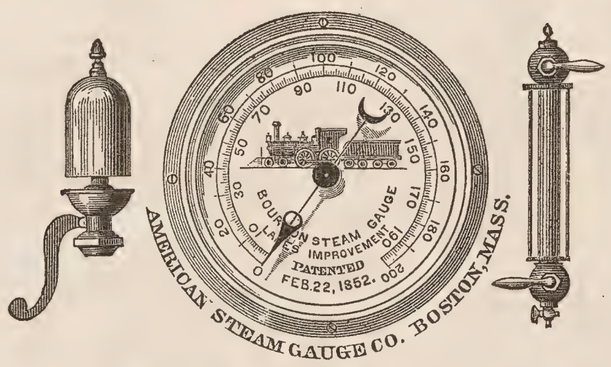

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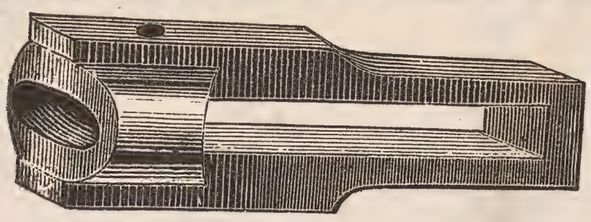

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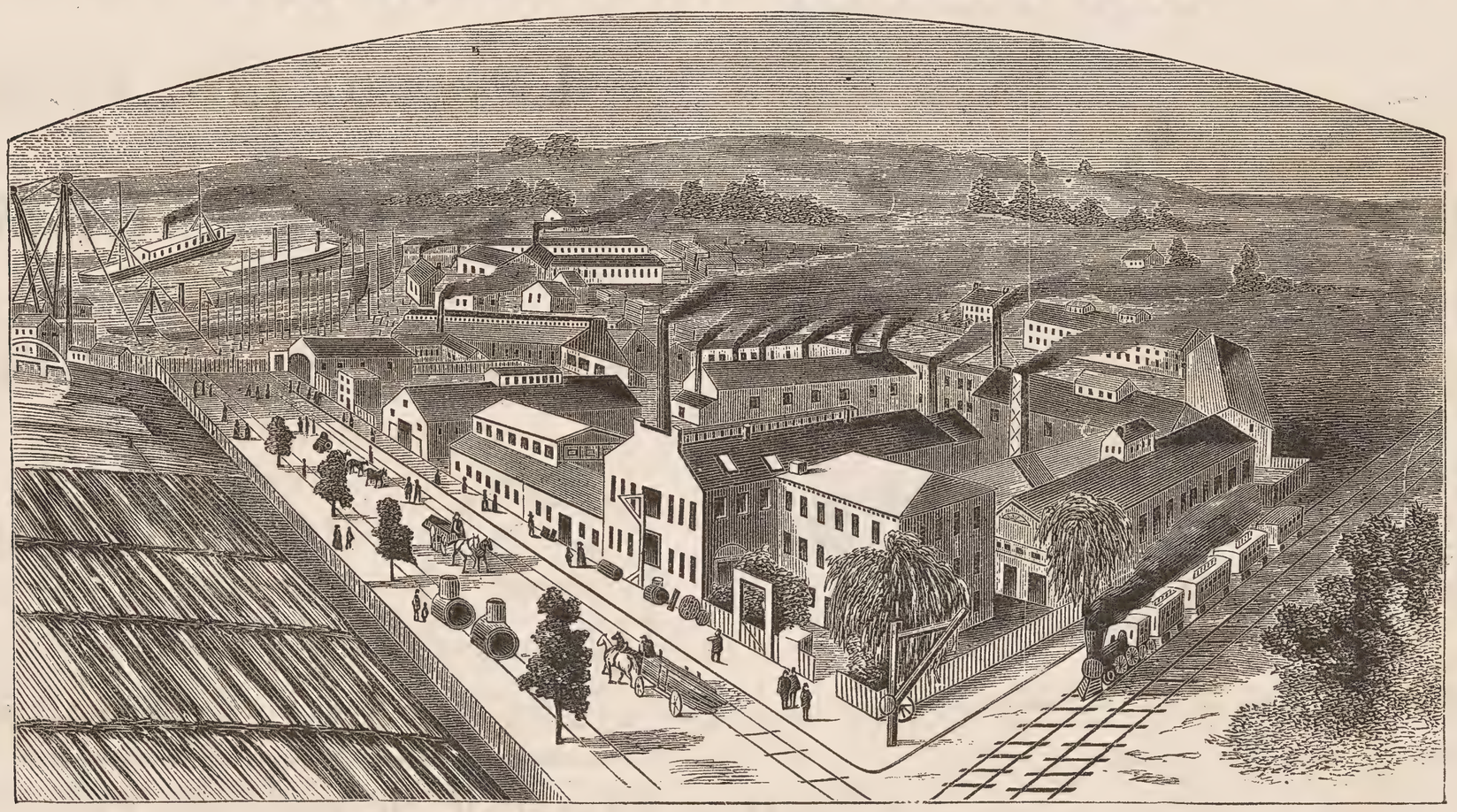

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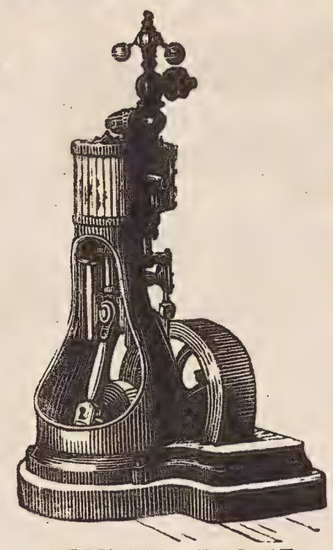

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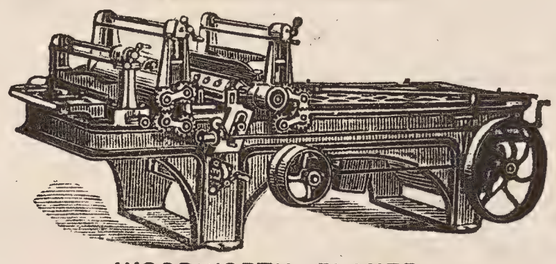

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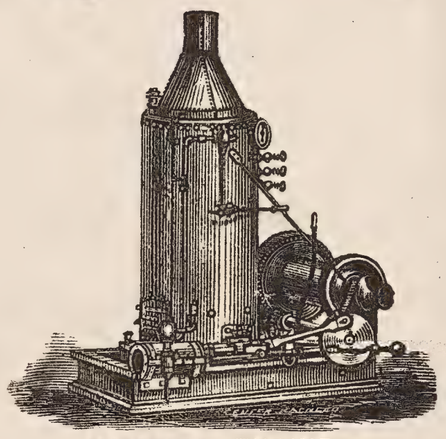

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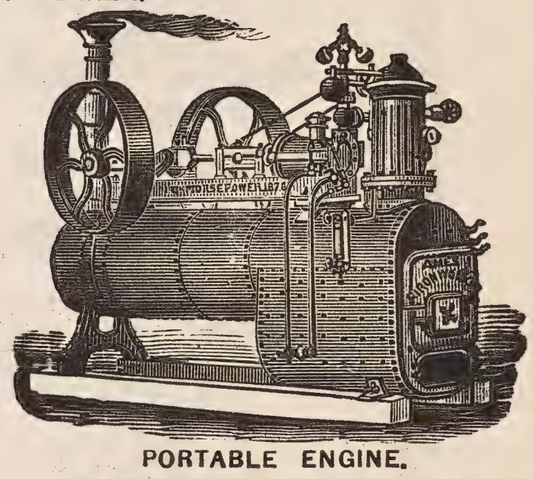

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Vol. IV. / *No. 11.* — NOVEMBER, 1873. — *One Dollar per Annum.* / *Single Copies, 10 Cents.*

Car-Coupling.

THE *Railroad Gazette*, remarking upon the worthlessness of the great majority of car-coupling devices, and the lack of information on the part of inventors as to the practical requirements of the case, says,

"It is, of course, possible that some invention may be provided by which cars may be coupled without incurring any danger in doing it, but we believe that in this case much more can be immediately accomplished by improving the existing forms and methods of construction than by attempting to introduce more sweeping reforms.

"In a few minutes' conversation with almost any intelligent brakeman one can learn which kind of car is considered most difficult and dangerous to couple. The reasons for this opinion can also usually be traced out. It will often be found, however, that while the opinions of such men are sound, the reason they give for holding them are not. Their opinions and impressions are the result of observation and the daily training which practice gives them, but their reasoning is often mere prejudice. In other words, such men are experienced in the art of coupling cars, but very inexperienced in the use of the reasoning faculty. It is not, however, very difficult to discover with the aid of such men the peculiarities in the construction of cars which make them dangerous. As an example, let us take the construction of the ordinary wrought-iron draw-head. Usually the space allowed between the buffer-beam or dead-wood and the coupling-pin is so little, that if the draw-head is forced back by contact with the adjoining car, the hand of the person attempting at the same time to draw the coupling-pin, will be and often is, crushed between it and the dead-wood. Now, obviously the cure for this would be, either to allow more space between the pin and the car, or else put a stop of some kind to prevent the movement of the draw-head farther than a certain point, and thus allow room enough for a man's hand. It will also be found than on many cars blocks of wood or iron castings are placed in such positions that a man can not reach the coupling-link or pin without assuming a very constrained and awkward position, or exposing some portion of his body to the danger of crushing in case the collision of the cars is at all violent, as it often is. In other cars, there is too little room allowed between the platforms or buffer-beams for a man to stand when both draw-heads are compressed. In others, bolt-heads and sometimes the side-sills are allowed to project so that a man is liable to be caught between them, especially on sharp curves. We mention these only as examples of dangerous forms of construction. Our list is not intended to be at all complete, but only to indicate how, by getting the experience of the men who are exposed to these dangers, their cause may be discovered. Much information could also be gained, if on through lines, over which cars from other roads are run, a careful record were kept of such accidents and of the kind of cars which caused them.

"Careful investigations of the accidents which now occur would, we believe, inevitably show that a large number of them are preventible by improved forms and methods of construction, and these improvements could be made without departing materially from the present way of building cars. If, however, any practicable invention will make it possible to couple cars without going between them, that invention will be the means of preventing an immense loss of life, and of saving incalculable suffering. What we want to make as clear as we can is, first, that cars of the ordinary method of construction can *certainly* be made safer, and that to make them so it is only necessary to exercise ordinary intelligent observation; and, second, that some invention *may* be practicable which will eliminate almost entirely the danger from coupling cars. At the last convention of the Master Car-Builders' Association, a committee was appointed to report upon this subject. If they do nothing more than collect statistics of the number of people injured from coupling-cars, they will do a great service, as they will thus draw public attention to a subject that sadly needs it. They can, however, do much more than this: they can get the results of the observation of most of the members of the association, who for years have had opportunities of learning the causes which make coupling cars so dangerous.

"Should the committee undertake to investigate the merits of inventions for coupling-cars, their task, we fear, will not be an enviable one. To say nothing of the magnitude of the undertaking, it would, we think, be a very serious matter to be obliged to listen to all the patentees of such devices who would want to recommend their inventions. The responsibility of this committee is very great, as they have it in their power to stay in a measure the great waste of human life and limb which each year are sacrificed because so little effort is made to prevent it. Seldom is such an opportunity of being useful to our fellow-creatures afforded to any of us."

Friction of Journals.

THE following article, contributed by Professor John E. Sweet, of Cornell University, to the *American Artisan*, will be especially interesting to master-mechanics and master car-builders, in connection with the standard axle-journal:

The three laws of friction—first, the frictional resistance between a given pair of surfaces of any material is proportional to the pressure that keeps them in contact; second, the frictional resistance is unaffected by the area of contact; third, the frictional resistance is wholly unaffected by the relative velocity of the rubbing surfaces—are of course based on the assumption that the conditions remain the same; but to change either of the elements without at the same time changing the conditions, is so difficult, and the change of conditions is so likely to escape our notice, that the old-school mechanic is ready, with a fair show of reason, to dispute the reliability of the law; and the young mechanic is at a loss to reconcile the laws with the apparent results; hence to point out some of the causes that operate to change the conditions may assist in fixing the laws more firmly in the mind of the mechanic, and serve to influence the student to go to the bottom for the cause rather than bubble up with a conclusion. Both theoretically and practically it takes twice as much power to draw two bricks, one upon the other, along on a stone slab as it does one; but if, in the place of bricks, we take blocks of cast-iron, and in the place of a stone slab we take a perfectly flat iron plate, and lubricate the surfaces with a sufficiently limpid oil, it is possible to so proportion the parts as to make it take far more than twice the power to move the two blocks than the one, because with the single block the bearing surfaces may be so proportioned that the lubricant will just be able to sustain the weight; whereas with the two blocks, the oil would be forced out, and cast-iron upon cast-iron slides harder than cast-iron on oil. Again, if a very heavy lubricant (tar, for instance) was used, and the bearing surfaces were large, it may take much less than twice the power to move the two blocks than the one, because the resistance offered by the tenacious qualities of the tar would not be doubled by doubling the weight.

In considering the second law, which signifies that the brick on the flat stone will require the same power and no more to move it, whether it slides on the flat side, on its edge, or on end, I mention some cast-iron surface plates we are making, (and, by the way, this is intended as an advertisement.) Placing two carefully together, one will glide upon the other by the slightest touch; so easily, in fact, that, when placed at an inclination of one in eighty, or only an eighth of an inch in ten inches, the upper plate will slide off the lower one readily; whereas, if the upper plate be set on edge, and with a surface equally well finished, it requires an angle as steep as one in eight before it will move at all. Again, if the two flat surfaces be slid together under considerable pressure it will require a force quite equal to the weight of the upper plate to move it; that is, if the plates are set vertical, one will not slide off the other. In each case both the metal and the surfaces are in the same condition; but in the first place a thin film of air is caught and held between the dead true surfaces, serving as a very limpid lubricant. In the second place, the two cast-iron surfaces run together; and in the third place, the two surfaces are not only held together by the weight of the iron, but with a certain amount of atmospheric pressure in addition. Thus we see that by carrying the experiment to an extreme, we discover conditions well calculated to escape notice in ordinary practice.

The third law implies that if the brick was drawn along over the stone slab by a spring balance, the balance would always indicate the same strain, whether the brick was drawn at a speed of one mile an hour or twenty miles; but it is possible for slides to

be made to work with apparently less friction at high speed than at low; that is, a lubricator might have just body enough to support a given weight at high speed, and yet be so light as to be crowded out at a low speed.

In applying the laws to journals, another element comes in which is liable to confound one, and has not always been so clearly explained as to be comprehensible to the unscientific. Let us take, for example, a wheel one foot in diameter, mounted upon a shaft one inch in diameter: if a string be passed over the outside of the wheel and a weight attached to its end, it will require a given weight to turn it; now if a shaft of the same weight, but of twice the diameter, be substituted for the inch-shaft, it will require just twice the weight to turn it. The friction surface and speed of friction surface have both been doubled; but as the law says that neither makes the difference, then what does? Let us for a moment disregard the frictional resistance and substitute for it some other resistance, and then see what explanation would be accepted. Take the same twelve-inch wheel and one-inch shaft, attach a cord and twelve-pound weight to the shaft, and it will require but a full pound weight on the string over the wheel to turn it; whereas the two-inch shaft and the same twelve-pound weight will require two pounds full to turn it, because in the first case we have twice the leverage we do in the other; so no matter whether the resistance is friction or weight, *the difference is wholly accounted for by the difference in leverage;* like all other uses of the lever, what is lost or gained in power is gain or loss in distance and time. But those are results, not the cause, and, unlike the use of the lever for lifting weights or performing work, this loss of distance is a help rather than a disadvantage. The introduction of friction rollers is but the introduction of compound levers. I am conscious that this is not the explanation given in the text-books, nor by what is considered the best authorities; but it is an explanation that seems to be readily comprehended by the unscientific, and there are a good many who can understand the action of a lever better than they can a mathematical demonstration, however lucid or conclusive.

The law that it requires a given amount of power to accomplish a given amount of work in addition to what is lost in friction, makes this study of loss by friction one of the three leading features in the construction of machinery; in fact, it about all centres on that one point, for good proportions and simplicity of construction are valuable because they are economical, and are economical mainly as they reduce friction, and thereby running expenses. To reduce loss by friction, I have hinted at two modes, the one to make surfaces so generous in size and true in form that a limpid lubricator may be maintained between them, and the other is to take a leverage over it; the first involves the use of more material, a better quality, and good workmanship; and the second, when carried to any extent, the use of complication. Large wearing surfaces amount to nothing unless they are true; for if there is a single point projecting beyond the general surface only so far as to break through the film of oil, the large surface is of but little avail until the point is worn away. Again, if the surfaces by any cause are thrown out of line, even to the smallest degree, and the pressure brought to bear on one side or end, the large surface is useless. Self-contained rigid frames and good workmanship, or self-adjusting boxes and slides, and also good workmanship, are indispenable requisites if the benefits of large wearing surfaces are to be obtained. To combine the advantages of large wearing surfaces with the advantages of leverage over the friction, the use of long small bearings at once suggests itself, but to this there is a limit. When the bearing is so long and so weak as to spring within itself to the extent equal to the thickness of the film of oil, then the limit is passed. In line shafting, of a proper strength for the work it has to do, four diameters, in self-adjusting boxes, is certainly not too long, and no doubt a great percentage of bearings might be advantageously carried to the same proportions; but in an ordinary steam-engine, with ordinary boxes and any thing like that proportion, the spring of the shaft and wrist-pin and the twist of the crank would prove fatal. Still to make them short is not necessarily the only resort; either increasing the size and strength as well as length, using self-adjusting boxes, or using whole instead of half cranks, balancing the strain on each end of the wrist-pin, will lead out of the difficulty. To determine just the best possible proportion for any special case would be very difficult, and to establish any formula that would hold good in all cases would be an endless if not an impossible one; but this much may be said with tolerable safety: when a bearing heats and wears away, it either has too small surface, what surface there is is not true, or the working faces are not in line, and it is often all three. And again, it may be said, without great fear of refutation, that when the engineer has to resort to special brass or bronze to stand the wear, and any specially complicated take-up device to prevent pounding, he has adopted costly remedies to overcome a complaint he did not understand. It costs less to run journals on oil than on bronze; not more in original outlay, while less attention, much less expense for fuel, and infinitely less expense for repairs are required.

Durability of Timber.

THERE is great diversity of opinion, not only among workmen whose views are derived from individual experience, but also among scientific writers of wide research and observation, as to the conditions under which wood will last, and those which hasten or permit its rapid decay. Experience itself, which might naturally be regarded as the safest possible guide, seems to show directly conflicting results; as a timber of a certain kind, exposed in a certain manner in one locality, will be found perfectly sound after the lapse of many years, and in another locality, after a much shorter interval, will prove to be entirely rotten. The difference of locality is a point of great importance, but often overlooked, and much surprise therefore groundlessly expressed at the apparent opposition of these practical developments to each other. It must, however, be sufficiently manifest that at points separated by a considerable distance such differences of climate, soil, water, and atmospheric influences must exist as will readily account for the durability of a given kind of wood in the one case and its quick decay in the other. And besides the question of locality, there are a multitude of other circumstances influencing the durability of timber, none of which can be left out of the account if we would arrive at a sound theory as to the causes of decay and the means of its prevention. As an example of the radical difference in the result which an apparently immaterial difference in the conditions may produce, a case is mentioned where fence-boards of New-England, white soft pine, in the natural state and not touching the ground, were found entirely free from decay after more than fifty years' exposure; while heavy sticks of timber of the same wood, exposed in exactly the same way, decayed in a much shorter time. In this case, the difference in size seemed to be the only cause of the variation in durability.

It is generally agreed that the primary and leading causes of the decay of wood are the decomposition of the albumen contained in the sap part, and gradual oxidation or spontaneous combustion in both the sap and heart parts, but more particularly the latter. In the first place, the decomposition of the albumen produces a poison which by contact with the heart-wood rapidly destroys it. The other cause mentioned operates at the same time in both parts of the timber. The assertion frequently made that wood will not decay unless exposed to air and water, is not supported by facts. The timber under water and more or less exposed to air has been known to remain perfectly sound for more than a hundred years; and on the other hand, oak and pine timbers imbedded in masonry and almost absolutely protected from either air or moisture, have been found rotten after a very few years had elapsed.

A false impression in regard to the durability of certain kinds of timber has been the cause of heavy expenditure which might easily have been avoided had the matter been properly understood. For instance, when oak or chestnut are cheap and near at hand, it is a worse than useless outlay of money and time to pay a high price for hemlock and haul it a great distance, for boards and scantling for a barn or other similar building. Again, in obtaining timber for fence-posts, it is often considered imperatively necessary that oak should be used, when red-elm or even butternut would answer fully as well, and if seasoned before using, will be quite as durable. Butternut is one of the most beautiful woods that can be selected for the inside finish of a house, such as the wainscoting of a parlor or the hand-rail and balusters of a stairway. It requires special care in seasoning, in order that it may be kept straight, as it is peculiarly liable to warp and spring. Red-beech is also a valuable substitute for oak for sills, posts, floor-boards, etc., provided always that it is seasoned and straight, this being a vitally important point. Basswood is another kind of timber which might often be used with a great saving of expense, for floors of barns and other buildings, vertical boarding, etc., or in fact in any case where not too much exposed to heat and moisture, which it will resist for a long time if seasoned, planed, and painted before putting up.

The active influence of soil on the durability of timber is illustrated by the fact that fence-posts and mud-sills of red cedar-heart have remained sound for over fifty years in clay and loam, while in limy soil the same wood rapidly decayed. The same effect of the lime soil has been observed in the case of white-oak fence-posts, which rotted in a few years, while from trees of the same kind which had lain in the mud for more than a century, timber was cut for a sheltered frame, not in contact with the soil, and thirty years afterward was in perfectly good condition.

Numerous experiments have been made in treating wood so as to preserve it from decay, and a variety of patented processes are now in use. The treatment known as "Kyanizing" was one of the earliest methods used in this country, and often with good effect. It consisted of an infusion of corrosive sublimate, and imparted such durability to chestnut railroad-ties, in one instance on record, that, after lying eleven years on a lime soil, they were in even better condition than when put down, while other ties of the same wood, not kyanized, gave out in seven years. The process, however, was extremely unhealthy in its effects upon the workmen who applied it, and was ultimately abandoned.

A method largely and very successfully adopted for rendering timber imperishable is known, with various modifications, by the general term of creosotizing. Its most effectual application appears to be in the form of oil from gas-tar, by the use of which railway sleepers of fir, oak, beech, and other woods have been made practically rot-proof. The lasting utility of the process depends upon the thoroughness with which the wood is impregnated with the creosote. This should be carried to the point of complete saturation, except in the case of oak, where it is only necessary that the sap-wood should be saturated. The wood also requires to be exposed to the air for eight or ten months before undergoing treatment, and the heart wood, where exposed, should be perforated so as to allow the preparation thorough access to every part.

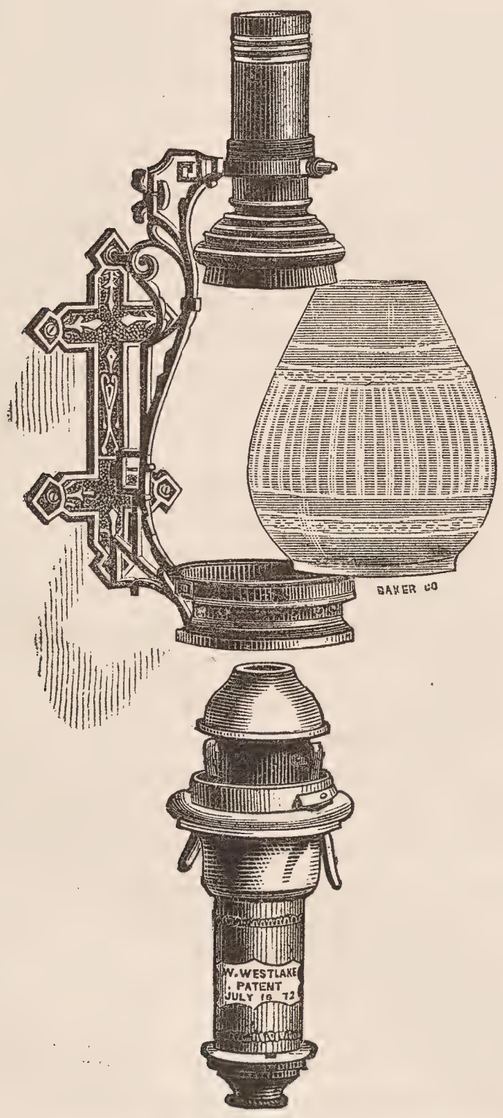
Sulphate of copper, sulphate of iron, petroleum, whale-oil, and lime-water have been used with good results in the treatment of timber. In the treatment called Burnettizing, which has been extensively applied in this country, the preservative element is chloride of zinc. Wood is rendered nearly incombustible and prevented from decaying under ground by placing it, with the surface unplaned, in a bath of 1 part concentrated silicate of potassa and 3 parts pure water, allowing it to remain twenty-four hours, and after several

days' drying giving it a second immersion. When again dry, it should receive three coats of a paint composed of 1 part cement and 4 parts of the liquid used for the bath, and is then ready for service.

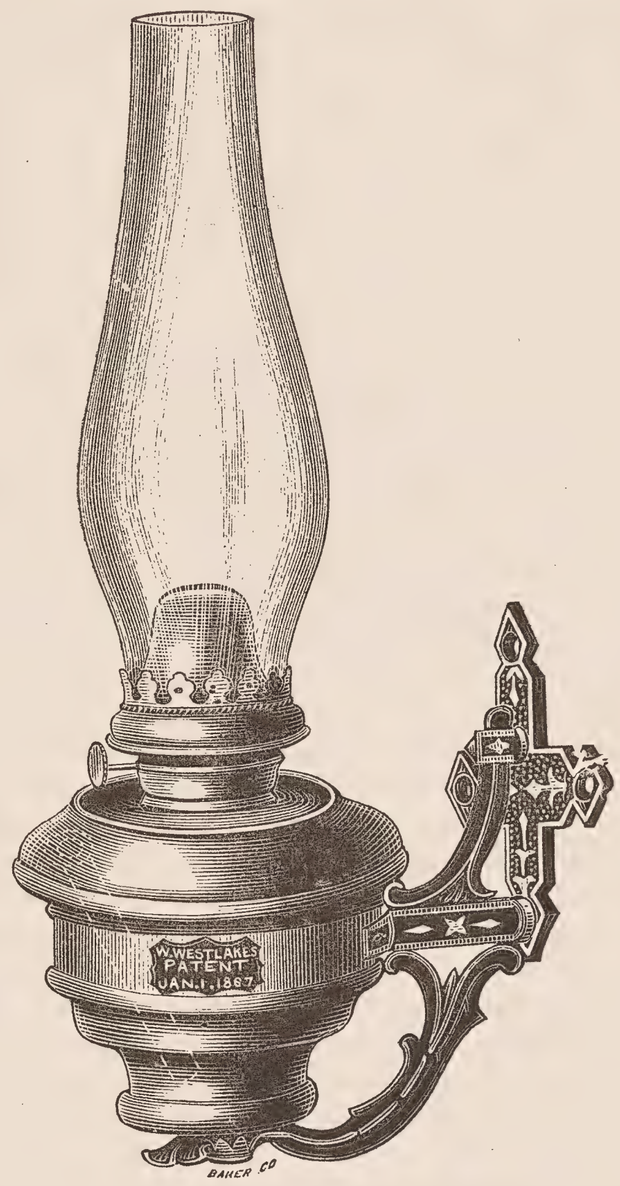
In a process patented a few years since, the treatment consisted in immersing the wood from two to twelve hours, (according to its porosity and thickness,) in a boiling solution of borax in water, contained in a wooden or iron tank. This was followed by a second immersion, but of only half the duration of the first. When dry, the wood was ready for use; or if desired, its discoloration could be removed by washing in boiling water. The wood could also, after treatment, be further impregnated with tar or coal-oil, applied in the usual manner. To render it perfectly water-proof, resin, gum-shellac, or other suitable substance was added to the liquid used for second immersion of the wood. It was claimed for the borax solution that it dissolved and removed all the perishable substances which caused the decay of the wood, without any injury whatever to the fibre, rendering it, on the contrary, very hard, nearly incombustible, and proof against water, vermin, and the effects of either a moist or dry atmosphere.—*Leffell's Mechanical News.*

Lighting of Passenger-Cars.

Every traveler on night-trains is aware that a well-lighted car is vastly more agreeable and comfortable than one that is poorly lighted, and railway managers are beginning to realize the importance of such an improvement upon the old methods of lighting as will satisfy the demands of the public, and harmonize with the interior finish and fitting up of the luxurious modern passenger-coach. A few years ago, a few miserable candles, or inferior or badly-trimmed lamps, better suited to a livery-stable or some obscure passage-way, were considered sufficient for an ordinary passenger-car. Improvements, however, have gradually been introduced, embracing different methods of lighting; but none of them have been so unqualifiedly good as to fulfill all the required conditions of safety, economy, and convenience. What is wanted is a light



as good as that of an ordinary parlor, and of sufficient brilliancy to enable passengers to read. It must also be clear and steady, not liable to grow dim for want of frequent attention, and in case of accident or violent displacement, it should be self-extinguishing. The prime requisite of safety precludes the use of explosive or highly inflammable oils, or any agent that endangers the lives of passengers by sudden conflagration. Kerosene is extensively used, but it is unsafe, and should be superseded by something better. Candles are safer, but give an inferior light. Coal-gas is more satisfactory as to its illuminating qualities, but its use on cars necessitates an expensive and complicated apparatus, liable to easy derangement. It is also explosive, the jar of the train prevents the burners



from giving a steady light, the tanks add to the dead weight, and it is affected by severe cold. There seems at present to be a growing preference for lamps, and the use of oils that are absolutely non-explosive, like the mineral sperm. This oil gives a light fully equal to kerosene, and stands a fire test which renders it perfectly safe, even in the event of a run-off or collision.

A notable improvement in the design and construction of car-lamps has recently been made by Mr. Westlake, of the firm of Dane, Westlake & Covert, of Chicago. In response to frequent suggestions and requests from railway men who have practically realized the defects of the various methods of lighting heretofore in use, Mr. Westlake undertook the work of perfecting a lamp better suited to the service required by strength, durability, simplicity of construction, and capacity of being easily cleaned. The result was the designing of side and centre-lamps of different styles, adapted to the use of oil or candles. The engravings represent two side-lamps of different patterns. The smaller one shows the convenience of a loose globe which can be taken out and replaced in an instant. The candle-burner is shown lowered from its socket to give a better view of the improved fastening by means of which it can be shoved into its place by one movement of the hand, and where it is securely held by a double spring, with no liability to become disengaged by the motion of the car. The lamp once in place, never has to be taken down to remove the globe. In case oil is used, the lamp-pot takes the place of the candle socket, while the globe serves as a chimney. Whether candles or lamps are used, the various fastenings are so constructed as to wear tighter rather than to become loose with use. Every part of these lamps can be duplicated, so that injury to any one part does not involve the whole, or necessitate its return to the shop for repair. Globes can be replaced or exchanged, new sockets put in, and even oil-burners substituted for candles, without taking the apparatus from its place. The larger cut represents a side-bracket lamp. The lamp-pot is all of one piece, and so constructed that no oil can drip over or get on the car-seats. The above-named firm also manufacture car centre lamps the designs of which are exceedingly tasteful and ornamental, and, as a decorative feature of a first-class passenger-car, can hardly be excelled. These lamps cast no shadow, and the angle of the reflector above is such as to throw a flood of light over an entire car saloon. The various styles and patterns may be seen at the supply-store of Vose, Dinsmore & Co., 32 Warren Street, in this city, who are the agents of the manufacturers.

The above-named Chicago firm have recently patented an improvement in locomotive head-lights, the improvement consisting in placing the reflector and oil-pot on a partially revolving platform, so as to bring the former at a quarter angle with the side. The hand-hole is constructed so as to keep out the wind, and the burner can be lighted in a gale and the chimney replaced without stopping the train.

Recent Patents.

Car Ventilator, S. C. Maine, Boston, Mass.—At each end of the upper portion of the car are formed two ventilating ducts, each provided with a swing-door opening inward. The doors are turned from within the car, and held in any desired position, by means of a knob connected with a revolving disk provided with a beveled lug, which by the operation of the disk is made to impinge against or be released from the doors. The ducts in each end are connected with finely perforated tubes. Arranged at each end, so as to slide backward and forward, are hoods for increasing the draught.

Sleeping-Car, J. T. Leighton and D. R. Leighton, New-Haven, Ct.—The hinged seat-backs are turned up and secured in a vertical position, forming a support for the upper couch and a partition between the berth-sections. A ledge upon the car-wall, in combination with bars pivoted to the rear outer corner of each seat, and provided with a folding leg at the free end, supports the lower couch, which rests upon flexible slat-sections attached at each end to the angle of the seat. When not in use, these are, together with the pivoted bars, folded back and concealed behind the chair-backs.

Operating Car-Doors, J. A. O'Haire, West-Troy, N. Y.—A rod passes from the front to the rear of the car through a tube; on each end of the rod is a crank or lever, the front lever to be operated by the driver, and the rear one carrying a roller to work up and down in a rectangular frame secured to the rear edge of the door, and by means of which the door will move back and forth.

Car-Ventilator, A. J. Morrison, Troy, N. Y.—Three rectangular wings are attached to each other to form a wheel, and so arranged that, by a part revolution, the ventilator is closed or open, and held there by spring-bolts, which also stop the revolution of the wheel.

Car Ventilator, John J. Crowley, Whistler, Ala.—This invention consists of two ventilating pipes, a fan-blower, a conducting pipe, a distributing pipe, and a system of valves, all combined in a car in such manner that the fan-blower, which is driven by a belt from a pulley on one of the car axles, will force a blast of air into the car, no matter which way it runs, it being only necessary to shift the valves when the direction of the movement of the car is reversed.

Improved Car-Seat, P. F. Duchemin, Somerville, Mass.—This is a really elegant and very convenient seat for two persons, designed to take the place of the ordinary seat in passenger cars. While it occupies no more room, and can be afforded at a cost but little in advance of the car-seats in general use, the style of upholstery and characteristics of its finish render it much more elegant and comfortable.

The Locomotive regarded as a Machine.

BY JAMES M. BLANCHARD.

THE locomotive, when regarded merely as a machine, may well challenge the admiration of the philosopher and the scientist, as well as of the mechanician, as it undoubtedly embodies in itself more of thought and of the very science of mechanics than any other machine now extant; and if it is sometimes regarded with awe by those not familiar with it, it is not at all to be wondered at. The locomotive of to day, as it moves along through our valleys and over our mountains, is a thing of beauty and of such majestic appearance as to arrest the attention of the stoic.

But in order that a full comprehension of this device as a machine may be had, it will be important to examine its history, for the purpose of ascertaining what improvements have been made, and for the further purpose of determining whether or not the amount of thought bestowed upon it has been as productive of results as the same would have been if directed to other objects.

In March, 1802, Richard Trevithick and Andrew Vivian obtained a patent in England for the application of steam, acting by its expansive force, to propel carriages upon roads. The first carriage constructed under this patent had the general form of a stage-coach; the boiler and cylinder being placed in a square iron box behind the large wheels, and supported upon an iron frame resting upon such wheels, the boiler being fixed in a case which was lined on the inside with fire-clay, its lower part constituting the fire-box and its upper portion a space around the boiler through which the flame and heated gases circulated until they reached the chimney. This engine had but one cylinder, and that was placed horizontally, and was embraced for the most part by the boiler; its piston-rod being attached to a cross-head, which was connected to a cranked axle, upon one end of which there was placed a fly-wheel to aid the engine in passing its centres. Upon both ends of the cranked axle cog-wheels were placed, which geared into similar wheels upon the carriage in order that the reciprocating motion of the piston should be converted into a rotary motion, and communicated to the wheels of the carriage, which, being fixed upon their axles, gave a progressive movement to the carriage.

The front wheels of this engine were of the usual form, but were arranged to turn different angles to its body, so that its motion could be directed upon a common road when abrupt turns were to be made, and the toothed wheels upon either side could be thrown out of gear, and the opposite driving-wheel made to aid in giving the required obliquity to the machine. The steam which escaped from the cylinder was made to circulate in a case around the boiler, or around the box which inclosed it, and thus prevent the external atmosphere from affecting the temperature of the water within.

As showing that it was the intention of the inventors to use this carriage upon railroads, the following quotation is made from their specification:

"It is also to be noticed that we occasionally, or in certain cases, make the external periphery of the wheels uneven by projecting heads of nails, or bolts, or cross grooves, or fittings to railroads, when required and that in cases of hard pull, we cause a lever, bolt, or claw, to project through one or both of said wheels, so as to take hold of the ground."

The above description will give the reader something of an idea of the locomotive as it existed at the time spoken of, and thus enable him to contrast it with what it is at present. Two years after the date of the patent above referred to, Mr. Trevithick made an engine in South-Wales, which was tried upon the Merthyr Tidvil railroad. This engine had an eight-inch cylinder, with a stroke of four feet six inches, and drew upon the road as many cars as were required to carry ten tons of bar-iron a distance of nine miles, which feat it accomplished without any supply of water to the boiler in addition to what it contained at the time of starting, the engine traveling at the rate of five miles per hour.

This engine was similar in its general structure to the one patented two years before by the parties named above; the only material change being in the form of the carriage, it being adapted more especially to running upon a railroad.

It will be remembered that at the time of the construction of the engine referred to, the great objection to their use—one which was urged with great pertinacity by persons who were then regarded as authorities upon the subject—was that there would not be sufficient adhesion between the wheels and the rails to cause the engine to move upon such rails, much less to cause it to draw after it any load. So thoroughly was this conviction fastened upon the minds of some of the engineers and mechanics of that time, that in 1811 Mr. Blenkinsop, of Middleton Colliery, obtained a patent for the application of a toothed rail, which was to be extended the whole length of the road, into which cog-wheels to be worked by the engine were to mesh, and thus produce the movement of the train. The engine proposed for and used upon these rails had a cylindrical boiler with a fire-box in one of its ends, from which a single flue extended to its opposite end, at which point an up-take or chimney was attached. This boiler was mounted upon a frame, which rested upon four carrying wheels, which ran upon a smooth surface formed upon the upper surface of the rails. About midway of the boiler, two cylinders were inserted in its upper surface, their lower ends extending down into the steam and water space. Their upper ends projected above the outer surface of the boiler, and were covered with removable heads to which guides for the cross-heads were attached, the cross-heads being of sufficient length to allow the connecting-rods to pass down on each side of the boiler and frame, in order that their lower ends might be attached to cranks fixed upon shafts carrying pinions, which meshed into spur-wheels upon a shaft midway between the driving-wheels; which shaft carried upon each of its outer ends a cogged wheel, which meshed into the cogs formed upon the upper sufaces of the rails, so that as these wheels were made to rotate by the action of the pistons in the cylinders, the whole machine and any cars attached thereto would be carried forward without reference to the adhesion of the carrying wheels.

By the use of this form of track, the engine of Blenkinsop was enabled to ascend grades which the engine of Trevithick could not, and hence it was contended that the greatest obstacle to the use of the locomotive had been overcome.

This method of constructing rails and engines was soon abandoned, as it was ascertained that there was sufficient adhesion between the wheels and the rails to cause the engine to move any train which the power in the cylinders was equal to. This error of judgment, however, was not corrected until after Mr. Brunton had obtained a patent for what he termed his Mechanical Traveler, and had used the same in 1813. This traveler was so novel in its construction, and affords so strong a proof of the deep-seated error which has fastened itself upon the minds of the men of that day, that a short description of it can not with propriety be omitted from this article.

The boiler of this engine was similar to that employed by Mr. Blenkinsop, it being cylindrical, with a single flue passing through it. A single cylinder was placed upon one of its sides at its rear end, so that, as the piston was projected outward and to the rear of the engine, it would act upon a leg, which was made to represent as nearly as possible the leg of a human being in its method of operation. Upon the top of the boiler a bracket was fastened, from the upper end of which there projected arms, to which the ends of two legs were attached by a joint, intended to correspond in function with the hip-joint of a person. From this joint the legs extended downward to a point opposite to, and in line with, the centre of the cylinder where another joint was formed, corresponding with the knee-joint. To one of these joints the piston-rod was attached, while the lower portion of the legs extended downward far enough to permit a shoe hinged to the lower ends thereof to rest upon the ground, or upon a rail laid down for that purpose. When the piston in the cylinder was passed outward, it forced the legs to which it was attached backward at the point where it was connected thereto, in a line parallel with the centre of the cylinder; and as the lower end of the leg, or the foot, was prevented from being pushed backward by its hold upon the rail, the reaction was thrown upon the carriage, and it was forced forward. To the front edge of the leg, to which the piston-rod was attached, there was secured a rod which slid in guides fastened upon the upper surface of the boiler, one portion of which was furnished with teeth which meshed into a cog-wheel lying horizontally. On the opposite side of this cog-wheel, a sliding rack was fixed similar to the one described, which as the cog-wheel was turned around by the sliding rack first mentioned, was also moved backward and forward. These sliding racks were attached to the legs above the knees in such a manner that, when the piston of the engine was returning into the cylinder, a backward movement was given to the leg, which was opposite to the one to which the piston-rod was attached; and thus the two movements of the piston were made to give a progressive or forward movement to the engine, the feet being lifted from the rail, during the times in which they were being returned toward the engine, by straps or cords fastened to the legs below the knee-joints, and extending upward to the lever, to which the upper ends of the legs were secured.

This brings us down to about the time when Mr. George Stephenson constructed his Killingworth engine, which was a traction-engine, and was made in 1814, the experiments with which settled the question of sufficiency of adhesion, and thus relieved the minds of inventors and engineers from the further consideration of that problem, which, however, was not done without the expenditure of a vast amount of brain-labor, and a corresponding amount of money.

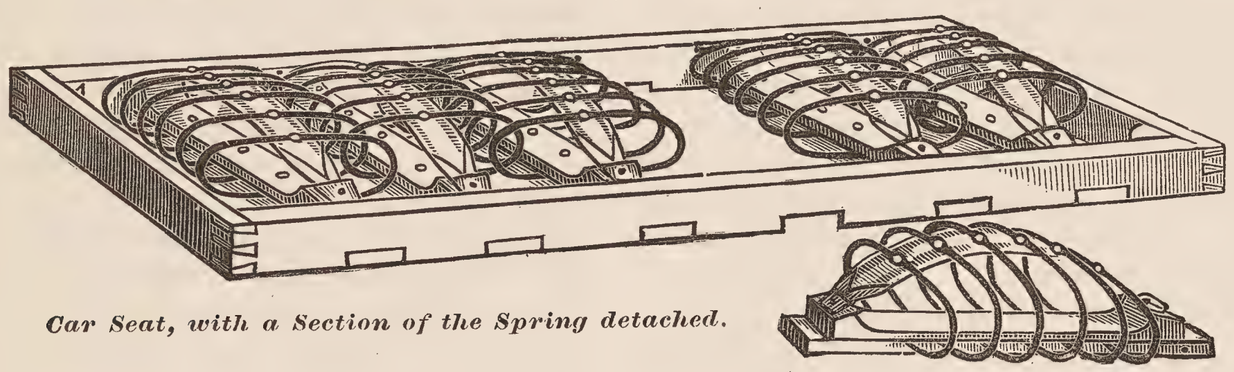
Commencing with the first recorded experiments with the locomotive, the writer has been enabled to trace about fifty distinct types of machines, each differing in some essential features from its predecessor, and yet all evincing profound study, and many of them developing some new scientific principle. These types have been subdivided into what may be termed species, to such an extent as to be numbered by hundreds, and thus the improvements upon this invaluable machine have gone on from the time of its first introduction to the present, and until the locomotive has become what we see it. To name any persons as having taken leading parts in the improvement of this greatest of all machines, other than George and Robert Stephenson, would be invidious, as so many are entitled to honorable mention in this connection, their combined labors being beyond any value that can be computed.

If the different forms that the machine has been made to assume could be spread out before us in one grand panorama, and if to this could be added the sleepless nights, the exhausted brains, and the aching hearts of all the thinkers upon this subject, we of the present time could form something like an adequate idea of the amount of thought expended, and of the practical results of that thought, when compared with the same amount bestowed on other subjects.

THE Boston and Fall River line are running coaches built after the English fashion. The car is divided into six compartments, with doors to each, on either side, each compartment seating eight persons. The windows are broad and quite high, affording a more extended view than is commonly had from the window of the ordinary passenger-car. Where a party of six or eight are traveling together, it is said to be a pleasant mode of traveling.

Cobb's Patent Elliptic Steel Springs.

THIS device, already known upon many leading lines of road, is specially adapted to car-seats and sleeping-car mattresses. We question if any plan has yet been discovered which gives to a car-seat cushion the agreeable spring and elasticity so desirable for the comfort of travelers, and which is so little liable to get out of order, or so easily and cheaply repaired, as the above-named springs. We invite the attention of those who have not yet given them a trial, to the accompanying cuts which convey a very clear idea of the operation of the springs, and the way in which they are arranged in the seat. Each is secured in its place by being fastened to slats, and the tops kept in position by webbing, as shown in the cut. For convenience in repairing, the springs in a seat are divided into six sets or sections, so that any one of them can be got at by simply removing the screws at the end of the slat, without



Car Seat, with a Section of the Spring detached.

disturbing the upholstery. This is a very great advantage, as will readily be seen, over former methods. No expense is spared by the manufacturers in obtaining the very best quality of steel to be found in this country or in Europe; and if on this account any objection should be made to the price of the springs, it is more than compensated in the saving of hair, the gain in elasticity, durability, and comfort, an even surface to upholster, and the ease with which they are cleansed. They have now been in use nearly four years, and according to the estimate of the proprietors, nearly a thousand cars, including many of the Pullman palace-coaches, are already equipped with them. Did our space permit, we could refer in detail to a large number of flattering testimonials submitted to us, bearing the signatures of car-superintendents of important roads in all parts of the country, and of palace and sleeping-car lines. We have no hesitation in recommending the spring for general adoption in the construction of car-seats, mattresses, etc. They are manufactured by the proprietors, Messrs. Z. Cobb & Sons, of Chicago, who also have a branch house at Wilmington, Del. Vose, Dinsmore & Co. are the agents in New-York.

Improved Box-Car.

THE Hamilton, Ont., *Times* contains the following account of an improved car invented by Mr. Joseph Taylor, Assistant General Superintendent of the Great Western Railway of Canada:

Our attention has been drawn to a box-car, of improved pattern, now running on the Great Western Railway, and which differs in some important respects from the ordinary car in use. As every body knows, the common box-car has two doors opposite each other, placed midway in the sides; many cars have also an end door, used only for loading such freight as can not conveniently be got in at the side-doors. But in the new car to which we refer the doors are placed opposite each other at one end of each side, and the single end door is dispensed with. The advantages claimed for the new design are numerous. The strength of the car is greatly increased, and its load-carrying capacity correspondingly multiplied.

This arises from the fact that the side-bracing is continuous and solid between the two points of support upon which the car rests, there being no opening or break in the middle in the place where the side-door is ordinarily placed, just where strength is required. It is the general complaint of railroad men, that cars employed in carrying heavy freight are continually requiring to be run into the shops for repairs in consequence of their "sagging," as it is technically called, in the centre. From this liability of the ordinary car to give way at its weak points, results another very serious inconvenience, in the twisting and spreading of the roof, rendering it leaky, and frequently causing freight to be damaged while in transit. In the improved car, under the heaviest load there will be no danger of this, as the centre is as strong as any part of the car. The great advantage of having the doors placed in the end of the sides lies in the fact that by this means long lengths of lumber, long rails, and other long freight can be loaded in box-cars with as much facility as any other kind. The longest length hitherto got into a box-car without an end door is sixteen feet; but in the improved car of the ordinary length of thirty-two feet, lumber, etc., up to thirty feet in length can be loaded. The end door, sometimes introduced in box-cars of the old pattern, was practically useless, as it required the cars to be cut off from their train and a long clear space left at the end of each car before it could be loaded. This extra door was also much objected to as lessening the security of the car against fire and pilferage. It is claimed for the improved box-car that it possesses all the advantages of both the box and flat or platform-cars; and that railroads requiring cars of both descriptions to accommodate different sorts of freight may, by the adoption of this new principle, obviate the necessity of large outlay in car-stock. An instance of this may be noted in the case of the traffic arising on the W. G. & B. R. Full train-loads of lumber come down that road, and large quantities of merchandise require to be sent north to supply the requirements of the numerous towns and villages in that district. For the former traffic platform-cars have to be sent up empty, returning loaded; for the latter, box-cars are sent up loaded, returning empty. By the adoption of the improved pattern, the same car would be equally available for both descriptions of traffic, and might be loaded both ways, to the great convenience of both the railway company and the public. One of these improved cars has been constructed, and is now running on the Great Western Railway, giving the most complete satisfaction; it has been examined and approved by many railroad officials, and will likely soon come into general adoption on our railroads. We understand that the Great Western Railway Company will soon have seventy-five more cars of the improved pattern running on that road.

A PLAN has been proposed for keeping the Erie Canal free of ice during the winter by means of pipes supplied with hot water from boilers located at suitable distances along the canal. The pipes being submerged a few inches from the surface of the water, it is calculated that the heat thus given off will keep the surface sufficiently warm to prevent any accumulation of ice, and thus render the canal navigable all winter. The estimated cost is considerable, but will be more than justified, it is said, by the accruing advantages. Visionary as it may appear, it may be practicable after all. Who knows?

THE Baltimore and Ohio Railroad Company are building at Newark, Ohio, what are claimed to be the most extensive car-shops in the West, and in which they expect to employ 1200 or 1500 persons. Five or six buildings are already completed, and workmen are now engaged in laying the foundation for two or three more.

Photographing Wrecks.

BY W. E. PARTRIDGE.

THERE is no place that affords so much practical instruction to the car-builder as the repair-shop. Here the anatomy of the car is exhibited, showing the character of its construction, and the effects produced by the wear and tear of the service to which it has been subjected. In like manner the "sick-yard," as it is called, affords a great deal of valuable information as regards the durability of material and its capacity to resist the strains and shocks of prolonged usage and occasional accident. There is many a stick of timber in a car which no degree of forethought would have provided, but which has been introduced because its necessity has been shown by a careful study of wrecks from collision, derailment, and otherwise. It is only by experience acquired in this way that improvements of real and permanent value are made. A car may, in a theoretical point of view, be perfectly constructed in every essential detail, yet every practical builder will have more or less distrust of its capacity, until it has been wrenched, and strained, and battered by service on the track, or by the more trying ordeal of accident. The responsibility of the builder involves the issues of life and death to such an extent that he will not rashly introduce innovations the utility of which have not been demonstrated by positive knowledge. Reckless and indifferent as railroad men are supposed to be in regard to the value of human life, they are nevertheless constantly devising means to render it more secure by providing all possible safeguards for its preservation.

It has occurred to us, as it doubtless has to others, that many defects of construction might be made more apparent, and be more clearly understood, if photographic views could be taken of wrecks to a greater extent than they now are, and such views supplied to all car-shops. It does not, of course, necessarily follow that cars are defective in their construction because they are broken in pieces by a violent collision. They are not designed to be proof against such trials, any more than a well-built lumber-wagon is expected to resist the onset of a locomotive in crossing a track. But as cars are wrecked in various ways, and as no two accidents are precisely alike in every particular, they are very likely to disclose many points of weakness in framing or in material, that might otherwise have escaped notice. The advantage of photographic views, taken on the spot, before the wreck has been disturbed, is evident from the fact that the cars would be shown just as the crash leaves them, and such views would be the next best thing to a personal inspection. The details would be exhibited with no shortcoming or exaggeration, and would show the character of the strains to which the several parts had been subjected. In a few noted instances, such views have been taken, and have proved of great interest to car-builders, who could study them at their leisure, and have time for consultation upon any special points that seemed to require it. In some cases, the torch is applied to wrecks to get them quickly out of the way; in others, the injured cars are hurried off to the repair-shop. In the former case, the fire obliterates any useful hints the wreck might have furnished; and in the latter, they are known only to the shop where the repairing is done.

There are few points upon any of our leading lines of road, where a photographer could not be obtained at short notice in the event of an accident. The view should be taken under the direction of some competent person, so as to illustrate to the best advantage such points as would be of most service to builders. This would, of course, involve a little delay in clearing the track for passing trains, but not enough, it seems to us, to compensate for the loss of the information which would otherwise be gained; for it is sometimes difficult to determine with any precision how fractures are produced in wrecked cars which have been hauled to the shop. We might cite many instances in which the photographer could have done good service in pre-

serving the features of railway disasters, but we think we have said enough to demonstrate the utility and practicability of the plan, and we hope to see its importance recognized by some concerted movement among railway men to carry it into effect. We would suggest also in this connection, that if car-builders would also have photographs taken of wrecked cars sent to their shops, especially such as best illustrate important points or principles of construction, and send them to other builders for their inspection, it would be of great mutual advantage.

Mining and Engineering.

SOME very interesting ceremonial exercises took place at Easton, Pa., on the 21st ult., upon the occasion of dedicating a new building designed for the use of the scientific department of Lafayette College. This structure, which is a noble specimen of architecture, costing over a quarter of a million of dollars, has been erected through the munificence of Mr. Ario Pardee, a gentleman largely engaged in mining operations, and presented by him to the college. The entire population of the city of Easton, together with a large number of visitors from other points, including prominent State officials and members of various professions, took part in the exercises. The studies pursued in the scientific department have special reference to mining and engineering, which are so extensively carried on in the immediate vicinity ; and the intelligent and well-directed generosity of the above-named gentleman will greatly promote the prosperity and usefulness of the institution in affording facilities for the acquisition of thorough scientific knowledge in the department of mining. The new building occupies a commanding site, and its façade presents a very imposing appearance. It is admirably arranged for the purposes for which it is designed, and contains a chemical department, with lecture-rooms and laboratories furnished with complete apparatus. There are also extensive geological cabinets, and specimens of minerals from all parts of the globe.

The inaugural address was delivered by Professor R. W. Raymond, President of the American Institute of Mining Engineers, and United States Commissioner of Mining Statistics. It was an able, eloquent, and instructive condensation of the extensive knowledge possessed by the speaker, whose familiarity with mining and engineering processes, and the prospective results of labor and enterprise in these departments, is not surpassed by any other of our scientific men. One important fact in modern metallurgy was noticed, which is the utilization of all natural resources and all means of production. The utilization of refuse is the measure of civilization ; and, as respects iron metallurgy, the great question of the day is the production of a good quality of iron from ores of a relatively inferior class. The same was true as respects gold and silver. Gold was no longer obtained in nuggets, or by rudely washing the auriferous earth ; but by sluicing down mountains, and concentrating vast quantities of almost barren material, and extracting the precious metal by affinity or chemical combination.

The members of the Institute of Mining Engineers were to hold their annual meeting on the following day at Easton, for the transaction of business, and the presentation and reading of papers upon various interesting topics.

THE Atlantic Car Company at Salem, Mass., has just filled a large order for the New-York Central and Hudson River road. The company is building 12 passenger-coaches for the Boston and Maine and 15 for the Eastern road, besides 250 coal-cars for the Boston, Clinton, and Fitchburg.

THE passenger-cars of the Old Colony and Newport road are all being fitted with the Sanborn & Gates ventilator, which has been adopted by the company.

THE Baltimore and Ohio Railroad propose to erect a new depot in Washington. Glass and iron will be the materials chiefly used in its construction.

Improved Railroad Switch.

THE illustration represents an invention which has for its object the construction of a switch connection which shall be free from the disadvantages resulting from the expansion and contraction of the switch-rail at different temperatures, causing either a too close contact so as to prevent the working of the rail, or a too wide opening resulting in the battering of the rails and their consequent frequent replacement. In the ordinary form of switch, it sometimes happens that the rails open as much as three inches during the night ; while if the fish-plates are screwed up tight, the ends may close up entirely in the heat of the day.

A is the switch-rail, connected rigidly, at the point B, to a long timber C, placed underneath and passing through the cross-ties which are cut for the purpose. The connection at B is such that the rail A pivots freely sidewise, while at its other end it communicates with the track-rails D by means of a suitable lever connection moving on a bed-plate E, as a substitute for the heavy cast-iron blocks. Bed-plate E rests on the cross-ties and gives a more elastic support to the switch-rail, preventing thereby the anvil-like resistance and quick wear of the same. The track-rails D also rest upon the bed-plate and are rigidly attached thereto. The timber C passes below the plate under the middle rail, and is firmly attached by bolts.

It will be observed that it is not so much the intention to overcome the expansion of the switch-rail A

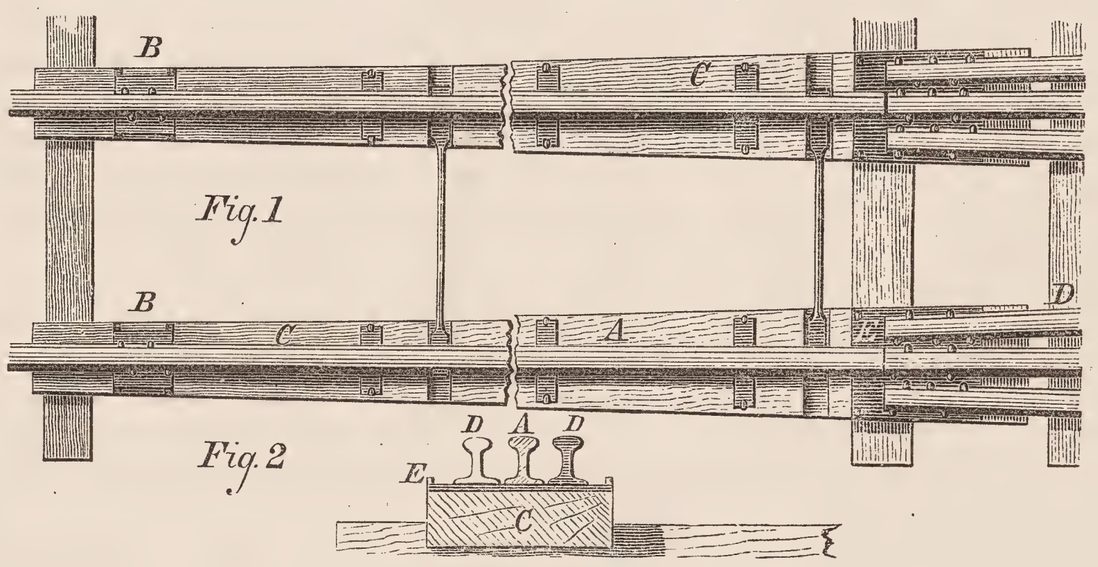


Fig. 1

Fig. 2

from point B to bed-plate, as such would only be about ¼ inch in some 18 feet ; but the main object sought is to make a firm connection between rails A and D, so that the adjoining rails of the track can not crowd the former together. The inventor states, as the result of his experience, that unless some arrangement of this kind be used, the rails, when the fish-plates are tightly screwed up, will run perhaps for a quarter of a mile, shoving up the switch-joint (that being the weakest part) in preference to overcoming the friction of the fish-plates and closing the usual ½-inch spaces left to allow for expansion between every two rails. By the present system, it is claimed, through the means above described, the rails are obliged to fill up these spaces completely, as they can not crowd toward the switch, so that the latter remains unaffected and the relative distance between the ends of the rails always uniform. The device, we are informed, has been in use on the Central Pacific Railroad during the past summer, and, even when the thermometer ranged from 100° to 110°, worked with perfect success. The construction is such as to resist any strains to which it may be subjected, the plates under both throw and stationary rails being bent at the end so as to cut down into the timber and thereby be prevented from any possibility of slipping.

Patented through the Scientific American Patent Agency, May 13th, 1873. For further particulars regarding rights, etc., address the inventor, Mr. John R. Adams, Truckee, Nevada County, Cal.

THE Danforth Locomotive Works, at Paterson, N. J., have retained their full force of employees, and are running seven hours per day. This course is preferred to discharging any of their men.

HON. JAMES F. JOY, of Detroit, in reply to a letter of inquiry as to the effect which the present financial difficulties will have upon the future construction of railroads, says that the difficulty arises from the vast sums of money which have been going into railroads, many of which are without merit, and many of which can not be profitable or remunerative for a long time to come. In his judgment, it will almost totally stop every work in progress, and no new ones can be undertaken for a long time.

There is every thing to discourage capitalists from putting money into this kind of investment. While the railroads have added to the value of the western country thousands of millions of dollars, made the country rich, and built up the towns and cities everywhere, they are treated as a sort of public enemy. The men who have put their money into them are treated and considered as extortionists and robbers. Even in Michigan, which is not half developed, and where at this time there is not a single road paying a fair interest on the cost of it, and most of them not half the interest, there exists this feeling, and capitalists are rapidly coming to feel that this kind of property is not safe.

He thinks, therefore, that we must feel that for a long time all improvements of this nature have come to an end in that State. This is much to be regretted, but in the present state of things there is no hope of any other result.

ONE good result of the panic is to be looked for in the turning of capital from projecting new railroads, to developing the country along those already built. Manufactures and mining will be stimulated, and the traffic of the roads will increase accordingly. The change will benefit the country at large, and existing lines in particular.

THE change of gauge on the Grand Trunk Railway west of Montreal was made, as announced, October 3d and 4th, and on October 6th trains commenced running on the 4 feet 8½ inches gauge. The line on which the gauge was changed was that from Montreal through Toronto to Stratford, 421 miles. The gauge of the line from Buffalo to Sarnia was made some time since. The company now has 814 miles of road of the standard gauge. The road east of Montreal, comprising the lines from Montreal to Portland, 297 miles ; from Richmond to Quebec, 96 miles ; the Rivière du Loup Division, 117 miles, and the Arthabaska Branch, 35 miles, are still of 5 feet 6 inches gauge. This portion of the line will eventually also be changed to the standard gauge. The broad-gauge rolling-stock will be used on these lines until worn out.

ONE of two locomotives manufactured at the South-Carolina Railroad shops in Charleston, made its trial trip from Charleston to Augusta recently, drawing a train of twelve loaded cars. The test of this really handsome home-made locomotive was perfectly satisfactory to the officers of the road on the up-trip, fully coming up to their most sanguine expectations in every particular. This locomotive in all its parts fully equals the best Northern-made locomotives. Its weight is 58,000 pounds—18-inch cylinder and 24-inch stroke, having a capacity of twenty loaded cars, with which it started on its return trip to Charleston. A decidedly important fact in connection with the construction of these locomotives by the South-Carolina Railroad, worthy of consideration by all of our leading railroads, is, that despite the disadvantages labored under in the lack of complete facilities for the construction of such work, the two were built at a cost of some $3500 below the cost of two locomotives of the same class built in Northern shops.

Gas-Burning Locomotive.

THE greatly increased cost of coal in England has called scientific attention to the economizing of fuel, and as an outcome of all the discussion and agitation, we have the numerous inventions for making and using gas that we have already noticed in this column. The latest invention brought out is designed to combine both gas making and using in one engine and at the same time. It is patented by Robert Walker, Westminster Chambers, Victoria street, Westminster, London. The locomotive is of the ordinary clumsy and awkward type used in England, except that there is no fire-box and that the tubes are quite large. Inside each tube is a gas pipe, with numerous jets on its upper side, and from these the gas escapes and burns in the tubes. Air is supplied at the rear end, and the product of combustion escapes into the stack in front. The gas is made by forcing atmospheric air into naphtha, petroleum, or any other hydrocarbon, and collecting it in a reservoir or tank from which it may be pressed into the pipes precisely as pressure is given to ordinary street gas. The gas-machine, oil-tanks, reservoir, etc., are placed on the tender, and the air-pump that supplies the air is connected with the cylinder at the front of the engine. The engine thus makes its own gas while running, and supplies its own fuel till the hydrocarbons are exhausted in the tanks. To get up steam and start the engine, manual power must be given to the air-pumps till enough gas has been made to fill the reservoir. Another way, would be to supply the reservoir with gas from a stationary reservoir beside the track till steam was up. We have no data concerning the speed or hauling power of Mr. Walker's engine. We doubt if the experiment has gone beyond the woodcut stage, but it is highly spoken of by the best English authorities, and very great things are expected of the invention. It can be also supplied to all other kinds of engines both marine and stationary, at a very great saving of expense and a great gain in storage capacity. Whatever the final results of this gas problem, Mr. Walker's patents will give the matter a great impetus in a new and unexpected direction.—*Boston Journal.*

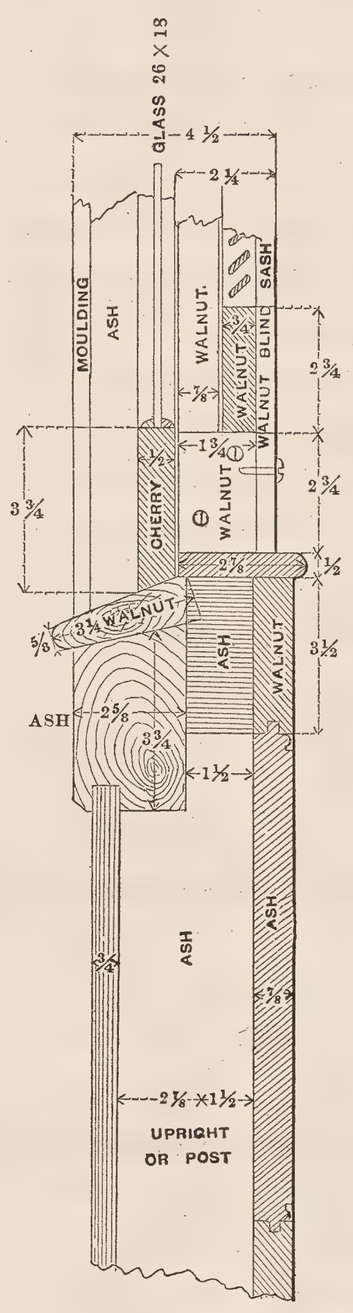
Cast-Steel Railway Axles.

A WRITER in a French periodical strongly advocates the use of cast-steel axles, on the ground that, when it is of good quality, such material will safely stand twice the strain of wrought-iron, and its bending and breaking moments will be in the same proportion. Calculating from these data, he says that the diameter of a steel axle compared with that of a wrought-iron one, will be as four to five, and its weight only five eighths of that of the other.

Another advantage enumerated of employing this material is, that the diameter of the journals may be diminished in the ratio of 0.706; and a steel journal will also bear a greater pressure per square inch of surface, without heating, than one of iron. The result of using a smaller-sized journal is to diminish the haulage, which in every vehicle varies directly as the proportion between the diameter of the journals and that of the wheels. The weight of a steel journal is about three quarters that of an iron one. By the adoption of steel axles there is also no necessity for making the wheel-bed, and consequently the nave of the wheel, so long. The length of this part of the axle has not much influence upon the strength of it, provided the diameter be increased slightly in excess of that immediately behind it, and that the junction between the wheel and the axle be thoroughly well secured. The fixing of the wheel on the axle has also a very considerable influence upon the strains. If the nave be short, and no keys be used in the connection, the tension must be proportionally great per square inch of surface of contact. Again, the "grinding" of the flanges of the wheels occasions a particular pressure on this part of the axle, and tends to shear it with a force inversely as the length of the bearing, but this may be mitigated by rounding the exterior edges of the nave of the wheels.—*Railway Register.*

Belt-Rail.

IN many parts of the country, the belt-rail is employed in framing the walls of cars. For certain classes of cars, it seems to have advantages which make it very desirable. Binding as it does the whole side of the car together at the window-sill, and converting the wall below this point into a trussed girder, it adds considerably to the vertical resistance afforded by the car. For heavy work, like sleepers or palace-cars, the belt-rail, by joining the posts or uprights firmly together, enables the diagonal braces to sit to a little better advantage than in the ordinary method of construction. The annexed sketch, on a scale of two inches to the foot, shows a section of the belt-rail put on by the Harlan and Hollingsworth Company, of Wilmington, Del. The rail itself is of ash, and is backed by a strip of ash between the uprights. It is secured in its place by both glue and screws, and, with the inside rail and panel, firmly grasps the upright or post, preventing it from moving sideways under the thrust of the diagonal braces when the brace-rods are screwed up tightly—a thing which is possible where the posts are secured by their outer edges only. The outside panels are, of course, in two parts, as the rail projects $\frac{7}{16}$ of an inch beyond the panels and the window-sill, which is commonly made continuous about $\frac{3}{8}$ more, or enough to make the total projection $\frac{3}{4}$ of an inch from the panel, and quite enough to provide for an effectual drip for the water running down on the upper part of the panels.



The posts or uprights, which are $2\frac{7}{8}$ x $1\frac{1}{2}$ inches, are notched out $1\frac{3}{8}$ inches to admit the rail, leaving them only $1\frac{1}{2}$ inches square at this point. They would probably show considerably less resistance to lateral strains at this point than posts of equal size framed in the ordinary manner. This is a matter which the builder can balance in his own mind against the advantages gained in the vertical strength. The sketch contains not only the dimensions of the various parts, but the names of the materials from which they are constructed. It is to be noted that the words "walnut blind sash" in the drawing should read walnut blind *strip*. It is placed upon the moulding or strip which holds the blind in place.

Uncomfortable Car-Seats.

WHY do not the makers of street cars contrive a seat-back that will be comfortable? Do their customers (preferring "short fares") order the cars to be made so as to discourage long riding? It would seem so, unless the painful curves of the seats are specially contrived to accommodate the humps of wirework and newspapers, so much affected by the women folk. Certain it is that the human form divine, male or female, has no curves to correspond with those set for the weary traveler to lean against. Only by making a hoop of himself can any normally shaped human being get his spine to touch the seat-back where it ought to find support. A caustic Briton declares it to be a characteristic of the genuine American that he always wants to sit on the small of his back. To judge from the ordinary structure of car-seats, one would think his sole desire to be to hang himself up by the shoulder-blades, the only certain line of contact between the sitter's back and the seats invariably crossing that portion of the body. Below that line, you can usually stuff a book or a bundle, or even a small satchel, with ease and comfort. In many cases, the original perversity of the seat-back is heightened by fastening a ridge of wood so as to increase the gap between the hollow of the sitter's back and the opposite curve of the seat. If the same board were placed six inches lower down, it would make some approach toward affording the passengers a back-rest where it is most needed.—*Scientific American.*

ONE of our chronic traveling miseries arises from the importunities of peddlers in the cars. The long-suffering public has, however, the suppression of this nuisance in its hands to a far greater degree than it may be aware of. A few days ago, a gentleman. whose temper had not been rendered more angelic by protracted travel, having been repeatedly aroused from a nap by an imp who shrieked, "Choice candy," "Last new novel," and "Fresh 'nanas," alternately in his ear and deposited them alternately in his lap, at length threw off the lamb and roused like the lion. "I warn you," said he, "that if you put another of those blessed things on my lap I'll throw it on the floor or out of the window." In his next round the persecutor passed him; but when he came the second time, flop went pop-corn into the victim's lap, and as promptly went to the further end of a long car. A neighbor, who entirely appreciated this conduct, presently let "the last new novel," which had been placed in his lap, slide off upon a particularly dirty floor. A little more of this manner of treating the nuisance, and it will abate.

TO jump safely from a car, stand on the lower step on one foot, holding the rail by the left hand, the right foot swinging clear, facing forward of course. When the car reaches the spot you wish to get off, let go with the hand, give a quick spring backward, and you come down with both feet, standing stock still. This same result would be achieved on a steam-car, running thirty miles an hour, providing one could spring backward with force enough to overcome the forward motion. Years ago, a man made it a practice to jump from a passenger train running at a speed of twenty-five miles an hour. He lived in Hyde Park, near Chicago, and never cared whether the train he was on stopped or not. He would go to the rear end of the rear car, gather himself up on the buffer, like a coiled spring, and shoot himself off backward.

M. L. BECKER, constructor at Offenbach, has introduced a regulator for car lubricators in which oil is used, allowing the latter to act in the usual way when the train is in motion, but stopping the supply of oil with the stoppage of the train.

The regulator consists of an elliptical vessel, funnel-shaped, which is fixed by means of a screw on the top of the oil-box, and within it is a small ball which when the train is not in motion, falls to the bottom closes the orifice there against the air, and arrests the flow of oil; when the train begins to move, the ball rotates around the hole, which is thus left free. Six months' trial have proved that the ball acts with perfect regularity, and that being always greasy it does not show any perceptible wear. The effect was shown by placing one of these regulators on one side of a locomotive, and it was found that the consumption of oil was 35 per cent less than at the other end of the same axle, not so provided.

The new regulator does not interfere with the replenishing of the box, but with the oil chamber may be made large enough to require filling only once a day; it also keeps the wick and oil remarkably clean. These little appliances cost from 23 to 33¾ francs per dozen.

The National Car-Builder,

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JAMES GILLET, EDITOR.

Terms, One Dollar per Annum.

NOVEMBER, 1873.

Editorial Announcements.

CORRESPONDENCE.—*We cordially invite the coöperation of the railroad public in affording us the material for a good mechanical paper. Articles relating to rolling-stock and machinery, by those practically acquainted with those subjects, will be gratefully received. All communications must be addressed to Vose, Dinsmore & Co., No.* 32 *Warren Street.*

ADVERTISING RATES.—*For one square, or one fifth of a column,* $5 *per month, or* $50 *a year. For half a square,* $3 *per month, or* $25 *a year. Larger advertisements by special contract.*

All communications in regard to advertising should be addressed to L. F. DINSMORE, *Post-Office Box* 4055, *New-York City, who is our agent for advertising, and authorized to make contracts, collections, etc.*

ENGRAVINGS AND ILLUSTRATIONS.

We would invite the attention of Master Car-Builders and others to the advantages to be derived from publishing in THE NATIONAL CAR-BUILDER *engravings designed to illustrate the various features and details of car construction, and especially such improvements as can not otherwise be clearly presented. We will procure cuts to be made in the best manner from drawings or models that may be sent us, and charge only for the cost of engraving, inserting the same in our paper with suitable descriptive details, without charge.*

The Way to Correct Wrong Impressions.

THE official report of the proceedings of the last annual meeting of the Master Car-Builders' Association is by this time in the hands of a large number of our readers, including superintendents and other railway officers of various grades. Much care and labor have been expended in its preparation, and it conveys a better idea of the work actually done at such meetings than can be gained from any previous report. The tone and spirit of the discussions, in connection with the reports of committees upon important subjects, will enable the reader to form correct impressions in regard to the aims and purposes of an organization which has, during the seven years of its existence, steadily increased in numbers and in usefulness. We trust this report will receive the attention it deserves, especially from the higher grades of railway officers, many of whom, we have reason to apprehend, are disposed to underrate, if not to deny altogether, the advantages of associations like those of the master-mechanics and master car-builders. This, we think, is caused mainly by the lack of correct information as to what is said and done at their annual meetings. The class of officials to which we refer, are not there to see and hear for themselves, and thus to form a right estimate of the character of the proceedings, and of the motives which inspire the members collectively. All they know about the doings is derived from meagre and imperfect reports in the daily newspapers, or from distorted verbal representations. Quite different are the impressions produced by a careful perusal of a faithful verbatim report, like the one to which we refer, and which is calculated to do much toward placing the association beyond the reach of mere prejudice or misrepresentation, by showing that its only object is to promote the efficiency of the department with which its members are identified, by such knowledge as may be acquired by intercourse and mutual consultation. There is no established seminary other than the machine and car-shop by which a railway mechanic can be properly fitted for his vocation, and even at these he is never quite ready to graduate. His education has a beginning but is never finished. The sphere of his duties is one of constant expansion and development; there are no time-worn traditional grooves, no hide-bound limitations, no rigid orthodoxy which it is heresy to question. Progress is the law of his being. A mechanical appliance not thought of yesterday, is a favorite to-day, and consigned to the scrap-heap to-morrow. The standard axle even may one of these days become an antique relic. The ever-increasing demand for new methods and devices, stimulated by ceaseless inventive activity, keeps the railway mechanic in a kind of transition state between the old and the new. Greater safety for passengers and train-men, cheaper transportation, more econonomical use of material, less wear and tear, quicker time, better brakes, couplers, wheels, etc., are constantly required, taxing to the utmost the capabilities of those in charge of the mechanical departments, and more especially of car-shops. For these men to remain isolated and restricted to the routine of the shops or road with which they are connected, would, in the nature of the case, contract their views and confirm them in obsolete notions inconsistent with progress and detrimental to railway interests. They are in daily need of such aid as can only be derived from association, to enable them to determine which of many devices for a special purpose is the best, so that, in the language of the evolution theory, only the fittest may survive; and also that every good suggestion originating in the fraternity, may at once become common property and be appropriated for the benefit of all.

In spite of these considerations, however, there are some superintendents and managers who are hostile to the associations we have named, alleging that their tendency is to produce insubordination and a sort of divided allegiance, by imposing an obligation upon their members to recognize whatever may be recommended by such associations touching mechanical appliances pertaining to the construction of rolling stock, as more authoritative than the opinions of their superior officers, or at least equally so, and that the result will be eventually to compel the roads to adopt whatever the associations may think proper to recommend. The reply to these allegations is contained in the following preamble and resolution unanimously adopted by the convention of master car-builders at Boston, in June last, and which may be found on page 76 of the report:

"*Whereas,* It is thought that an impression prevails among the managers of some railroads, that the action of this association is intended to be enforced by its members without the advice and consent of their superior officers; therefore

"*Resolved,* That it is the sense of this meeting, that the resolutions of the master car-builders, in convention assembled, are intended merely as recommendations, made as an association, to the managers of railroads for their adoption or rejection, as they may deem expedient."

This would seem to be sufficient to satisfy all candid minds; but there are exceptional cases, no doubt, in which this disclaimer will fail to remove existing prejudices originating in jealousy and a fear that undue credit will be awarded to the master-mechanic or master car-builder for any improvements introduced by them in their respective departments. A superintendent naturally desires to stand well with the directors whom he represents, and who are the source of his authority. He may have been selected solely for his mechanical knowledge and executive ability, or these may have been secondary considerations. Many important and responsible positions are obtained nowadays by personal influence and favoritism, irrespective of capacity, and it is possible that some railway offices may have been filled in this way. In either case, the incumbent does not like to have his functions encroached upon by subordinates to the injury of his reputation with the appointing power; and in case of incompetency on the part of the superior, the subordinates are pretty sure to find it out, and the relations between them cease to be in accord with their respective positions. A superintendent, because his grade is higher, is presumed to know more about the construction and repair of rolling-stock than the car-builder; but such is not necessarily the case—indeed, it is apt to be quite otherwise, and for obvious reasons. He has not usually had the requisite experience in such construction and repairing; and even if he had, his duties as superintendent engross his time to such an extent that he can not give his personal attention to the particular details of any one department, much less of all. These must be left to others who may be, and are, subordinates as respects grade and position, but not as implying capacity for their work inferior to that of the superintendent for his. The master car-builder must necessarily be allowed to exercise large discretion, otherwise he would be less than a subordinate—a mere instrument. He has capacity already acquired, and which every day's experience improves. Any outside interference with his duties except in the way of suggestion or recommendation by competent parties, is generally productive of more harm than good. He must assume his proper responsibility, and this he can not share with his superiors any more than he can share with them his sleep or his digestion. The attempt to do so would be a violation of the moral fitness of things and demoralize the service. To fit him more thoroughly for sustaining this responsibility, is the object of the association whose seventh annual report has just been published, and to which it is the design of this article to call the special attention of railroad officers.

Car Heating.

THE season has arrived which necessitates the warming of railway-cars for the comfort of passengers; but the introduction of the various kinds of apparatus for that purpose is attended with much additional peril and discomfort, for the reason that the most approved methods of heating now in use are not as entirely free from defects as could be desired. To devise a plan for supplying cars with the requisite warmth suited to the variations and extremes of winter temperature, without obstructing wholesome ventilation or increasing the hazard of fire in the event of derailment or collision, is an undertaking beset with difficulties; but the problem is receiving the attention its importance demands, and the result can not be otherwise than an improvement upon existing methods, as these are an improvement upon those formerly in use. The ordinary wood or coal stove, even when securely locked and fastened so as not to spill its contents or get displaced in case of accident, is little less than a nuisance a great part of the time, for the reason that it can not be regulated so as to maintain any thing like a uniform temperature under varying conditions. It is either too hot or too cold, one extreme begetting the other, and keeping passengers in a transition state between a chill and perspiration. Steam and hot water are used with very good results, and many people who get their ideas upon this and kindred topics from the daily newspapers, believe that all railway trains can be economically and effectively warmed by steam taken directly from the locomotive boiler, or by using the exhaust. This, however, is impracticable, as all railway men know, for reasons which need not be here stated. The principal objection to steam or hot-water heating, whether it is applied by a generator in each car or otherwise, is the liability of the water in the pipes or tanks to freeze in severe weather. It must necessarily be kept heated, or the tanks or pipes entirely emptied whenever the cars are standing still for any length of time. This can be done, of course, but it involves labor and expense, as well as risk of damage from neglect.

It is quite evident that if any method of heating cars is ever devised that will so nearly overcome all existing difficulties as to be recognized and adopted as a standard for all roads, it will be such a one as will combine heating and ventilation, and dispense with all connecting pipes between the cars. It is an easy thing to heat the air already in a car, and just as easy

to let it out and replace it with cold air to any extent required. A red-hot stove will accomplish the one, and plenty of open doors and windows the other. This, in a primitive way, is heating and ventilation, but it is not what the fastidious, fault-finding, sensitive traveling public require. They want to be made comfortable in these respects without knowing how the thing is done, and any means of doing it that gives them a realizing sense that it is *being* done, is pretty sure to prove a failure. Some new device is patented every month or two for car ventilation, which is nothing more than a new modification of windows and doors, leaving the essential part of the problem untouched. There is no difficulty in getting second-hand air out of a car; the trouble is to get a like quantity of fresh and unbreathed air into it in the right way—that is, of a medium temperature, especially if the outside temperature happens to be fifty or sixty degrees below a medium. This can only be accomplished by a heating apparatus so constructed as to be at the same time a supply ventilator, and the supply must be sufficient to renew the entire volume of air in a car, say once in ten or fifteen minutes. It must also be admitted so imperceptibly as to cause no inconvenience, and if possible, the inflowing current must be supplied with additional moisture to make up for the larger quantity held in solution by the air as it becomes heated, otherwise its dryness will be disagreeable to passengers. Cinders and dust must, of course, be excluded; and the fire, especially if it is inside the car, must be so secured that in case the car gets wrong side up or rolls down a declivity, the varnished woodwork will not be instantly ignited. Lastly, the cost of the apparatus must not be so great as to prove an obstacle to its general adoption.

These would seem to be the most important conditions required for the satisfactory heating and ventilation of railway-cars in winter. Are these conditious impossible of attainment? To admit that they are, would be a reflection upon the inventive skill and mechanical intelligence of the country. Good progress, ind ed, has already been made in the right direction, and every year witnesses a nearer approximation to the end desired. The Spear stove embodies the leading features we have enumerated, and may be considered a hopeful prophecy of the future. It is doubtless capable of further improvement; but with its present construction, a car in motion can not be warmed with it without the constant introduction of fresh air, which warms and ventilates at the same time. The extent to which these stoves have already been introduced on our railways, indicates that the principle they embody is a practicable one and worthy of being elaborated to a still greater degree of perfection. The rigors of a Russian winter render necessary the most effective means for heating and ventilating cars. After four years of trial, a plan has been adopted for the entire line of the Moscow and Koorsk Railway, by which fresh air is warmed in a long box or chamber underneath the floor, and then introduced into the interior of the car by means of valves. The heating is by steam supplied by a vertical boiler in one end of the car, and conveyed to a set of pipes inclosed in the air-chamber. The steam, after passing twice through the pipes, is condensed and again pumped into the boiler. The pressure is about 25 pounds to the inch, and three or more cars can be heated by one boiler. The cars are first-class, and about 40 feet long by 9½ wide. The success which has attended this method is another evidence of the practicability of introducing fresh air already warmed into cars, which is obviously far preferable to the practice of letting it in cold and warming it after it is in.

We do not, in what we have said, intend any disparagement of the many excellent methods of heating irrespective of ventilation. They are good as far as they go, but they ignore the essential principle which in our judgment must be recognized and practically applied before the two requisites of wholesome air, and a comfortable and uniform temperature can be secured for railway travelers in winter.

The Monetary Crisis.

It is not our province to discuss financial topics, and we do not know that we can add any thing new to what has been said respecting the causes and cure of the existing derangement in monetary affairs. As a rule, people are less concerned about the causes than they are about the effects. Every financial panic is itself the effect of causes operating in accordance with unchangeable laws which override all legal enactments; and any infraction of these laws is followed by the penalty incurred, as surely as night follows the day. In commercial communities like ours, abounding in natural resources, diversified industry, and activity in all the channels of trade, the so-called credit system may be used to great advantage. It is indeed indispensable for the transaction of business upon any extended scale; but it is liable to great abuses, which invariably produce those periodical panics which derange the regular course of business, unsettle values, and spread dismay for the time being among all classes of people. This abuse is very clearly exemplified in the construction and equipment, within the last four years, of twenty-five thousand miles of railroad, the aggregate including many merely speculative enterprises meeting no real existing want, but relying for success upon a traffic to be developed in the near or remote future, the remote being too often mistaken for the near. So long as enterprises of this class could float their securities, all went well; but the market gradually weakened under the continuously increasing supply, and finally broke down, as any other market would under a similar pressure. Not only have bonds been issued in large amounts, but quantities of negotiable paper, which could only be met at maturity by the sale of additional bonds during the interval. These two classes of paper have been used largely in the purchase of material and in general business transactions, constituting a kind of extemporized currency with no reliable basis, and producing, so far as it usurped the functions of a circulating medium, all the mischievous effects of unwarranted inflation. As long as they could be passed from hand to hand and kept afloat by financial legerdemain, there was no trouble; but when their actual value was tested, and their holders began to trust to them for support, they were found to be a delusion. There is great danger in anticipating the future in this way, especially if the company's capital is merely nominal. The prospective return in the way of traffic may be remote, but it must be sure, and there must be adequate provision for sustaining the work in the mean time, by promptly meeting the interest on existing indebtedness. The peril of numerous undertakings is in their inability to do this in the face of the general distrust of all securities issued by roads that are not on a thoroughly paying basis. The abuse of credit has checked the influx of capital from abroad, where it is plentiful and seeking good investments, and the tide will not set again in the direction of railroads until confidence is restored by a pretty thorough weeding out of all moonshine enterprises.

The only obstacle in the way of a healthy improvement in general business, including railway traffic, is the want of a circulating medium proportioned in quantity to the bulk of business to be transacted. The movement of the Western crop created, as it usually does, a sudden demand for currency, which our anomalous, unelastic, hide-bound financial system could not supply, thus increasing the disproportion instead of lessening it. Just at the time when inflation was required for the most legitimate of all business, the movement of our surplus products, and which a well-organized banking system should have provided for, a sudden and violent contraction, intensified by panic and the locking-up of millions of floating currency in private coffers, blocked the wheels of business and brought every thing to a stand-still. Inflation, we are aware, is a great bugbear with many, but an increase in the volume of currency to meet a corresponding increase in the legitimate demand for it, such as is caused by the handling of an immense cereal crop, is not properly inflation; because in such case the proportion of currency to the volume of business is not supposed to be changed, and when the specific demand ceases, there should be a corresponding contraction. A system of banking that is not sufficiently elastic to do this is not a system adapted to the wants of a commercial people. The check to railroad extension will, in the nature of the case, cause inconvenience for a time; but there is no reason why the general business of the country should be paralyzed or seriously hampered. In the elements of material wealth it is as rich as ever, and capital and labor are sure to find remunerative employment as soon as the present fright is over, and the channels of circulation supplied with a currency adequate to the needs of business, so that mercantile and manufacturing establishments, with ample resources and perfectly solvent, will not be forced to suspend payment of weekly wages or discharge their employees.

In regard to the business of car manufacturers, there will evidently be a very serious falling off for a time, owing to the embarrassments of new or partly completed roads in need of entirely new equipments. The old roads also will add as little as possible to their present equipment for the time being, but the aggregate consumption of rolling-stock will, in the long run, depend on the general traffic, which is not likely to fall off so long as the country remains productive; so that unless the cars built during the past two years have been in excess of the wants of the roads—which is not probable, except perhaps in case of some of the new roads—there will, from the necessities of traffic, and the constant wearing-out of cars now in use, be a corresponding demand for new cars in future. And as agricultural products, upon which the freight traffic mainly depends, are not likely to decrease, we do not see why the present depression in car-building should be more than temporary; and when the reaction begins, we may reasonably expect that the business will be done on a sounder and more satisfactory basis than it has been within the past year or so.

Car-Builders' Monthly Meeting.

The regular monthly meeting was held at the rooms of the Association, on the evening of the 16th ult. The following members were present: Messrs. Joseph Jones, Enos Varney, Leander Garey, David H. Baker, C. E. Garey, W. B. Wilkins, I. W. Van Houten, C. A. Smith, E. A. Olmstead, M. C. Andrews, and George Hackett; also a number of other gentlemen interested in railway progress.

The meeting was called to order by Mr. L. Garey, the Secretary of the Association. Before proceeding to the consideration of the special subjects announced for the evening,

Mr. W. C. Wren, of Brooklyn, upon the invitation of the chairman, exhibited a small portable cylinder, charged with illuminating gas made from crude petroleum, and to which a burner was attached which gave a clear and brilliant light, much superior to that of the ordinary coal-gas, as was shown by attaching a similar burner to the gas bracket over the table. It was claimed by the exhibitor that petroleum gas, while it gave a far better light, was very much cheaper than that made from coal, inasmuch as an average medium burner consumed five cubic feet of the latter per hour, while the same burner consumed but one cubic foot per hour of the former, which yielded a light equal to fifteen candles. The petroleum gas was not liable to condensation, nor was it affected by extremes of temperature. Its manufacturing cost was about eighty cents per thousand feet. It was adapted to the lighting of railway-cars as well as buildings, and has been successfully used in the Third Avenue palace-car during the past two severe winters. The cylinders containing it were placed underneath the car, with pipes leading to the roof inside, the pressure in the cylinders being from 200 to 300 pounds to the square inch. The superior lighting qualities of the gas were evident from the burner exhibited; and the exhibitor was subjected to quite a rigid cross-examination by two gentlemen present, in regard to the cost of the

article and its liability to explosion. Nothing, however, was elicited to weaken the force of what he had previously asserted in regard to its utility.

Mr. Anson Atwood, of New-York, exhibited a drawing illustrating an elastic car-wheel of which he is the inventor. The invention consists in making the wheel in two principal parts, one of which includes the hub, the spokes or plates, and a rim, which together form the central portion. The other part consists of the tire, which is concave at its inner surface, corresponding grooves being made in the outer surface of the rim of the central part. The space between the two parts forms an annular chamber which is packed with oakum or other fibrous material, securing the tire to the wheel without the use of bolts or other fastening, and forming at the same time an elastic cushion upon which the whole weight upon the wheel rests. The oakum is tamped into the chamber the same as into the seams of a vessel, and is sufficiently elastic to accommodate itself to any expansion or contraction of the tire. The advantages are, greater durability of the wheel, less liability of axles and wheels to break, and less wear upon the rails.

The chair then announced the regular subjects of discussion for the evening to be car centre-plates and side-bearings.

Mr. Baker said the New-Jersey Division of the Pennsylania road used the ordinary male and female centre-plate and solid side-bearings. He favored a small centre-plate, not exceeding eight inches in diameter.

Mr. Varney said the Fitchburg road used double curved rollers for side-bearings, and found them to answer very well in running upon sharp curves. In connection with these there was no centre-bearing, the upper centre-plate keeping its place within the lower one, but not touching the bottom or shoulders, the whole bearing being on the side-rollers.

Mr. Andrews suggested that an improvement might be made in centre-plates by placing in the cavity or centre of the lower one, some suitable elastic substance upon which the tenon of the upper plate could take a bearing, while the dust could be kept out by lips attached to the shoulders.

Mr. Garey thought well-lubricated centre-bearings were indispensable, especially in turning short curves. This was conclusively shown in hauling cars by horse-power on street-tracks in cities where the curves were sharp.

Some further conversation took place, when Mr. Smith moved that a committee be appointed to report upon the subject at the next annual meeting, which motion was agreed to. The committee will be announced hereafter.

The Chair announced that the subjects for discussion at the next monthly meeting, November 20th, would be the *Heating, Lighting, and Ventilation of Passenger-Cars.*

The meeting then adjourned.

Immediately after the formal adjournment, General E. S. Greeley invited those present to partake of a cold collation which had been provided in an adjoining room, under the auspices of the committee of merchants and supply-manufacturers and dealers appointed, last summer, upon the occasion of the annual meeting of the Association at Boston, which invitation was cordially accepted. After doing justice to the edibles, the company was called to order by Mr. Smith, the special purpose of which, he said, would be stated by General Greeley.

Mr. Greeley thereupon proceeded to say that, in behalf of the members of the Association, he desired to call the attention of those present to a matter involving the personal repute of their secretary, Mr. Garey, and the manner in which the duties of his official stewardship had been performed. For the past five years he (Mr. Garey) had discharged the duties of his position, which were no less responsible than laborious, without remuneration or reward, nor had he expected any. The members of the Association were not insensible to this, and desired to show their appreciation of his services by some suitable and substantial token, which would perpetuate the agreeable relations now existing between him and his associates, and be a pledge of remembrance in the changes and vicissitudes of the future. He was literally growing gray in the service; and although this was inseparable from advancing years and could not well be evaded, he could be relieved of the necessity of walking long distances, or the scarcely less fatiguing operation of riding in the street-cars. The Association, therefore, of which Mr. Garey had been so long the honored secretary, acting though a committee which had been appointed for that purpose, begged to present to him a horse and carriage, and to request his acceptance of the same as a feeble testimonial of their regard and esteem individually, and as an organized society. The horse and carriage would be ready for delivery at such place and time as the recipient might designate.

Mr. Garey responded in brief and fitting terms, accepting the gift, which was as much of a surprise to him as it was a gratifying testimonial of approval of the manner in which his duties had been performed. The only reward he had ever coveted or expected was the continued prosperity of the Association in the promotion of the objects for which it was designed. He felt that his own knowledge with respect to railway mechanism was comparatively superficial. Railroads were getting ahead of us in all branches of their operation; their demands upon us exceeded our capacities, and we had to be drawn along after them. To be equal to these demands should be the ambition of all of us. Mr. Garey concluded by cordially thanking the members of the Association for their valuable gift, which would be cherished by him as a token of their remembrance and as a guarantee of their future success.

THE *Railroad Gazette* points out some errors in the statements of a correspondent in our last issue, in which the writer makes an estimate of the increased cost of hauling the additional weight of the standard axle, basing his calculations upon 100 pounds per axle over the ordinary size, at a cost of 1¼ cents per ton, per mile, for hauling. This, as shown by the *Gazette,* is not only an excess in weight, but the assumed rate for hauling is also a very high freight rate, which of course necessarily *includes* the cost of hauling the dead weight of the whole train, engine and all. Taking the average rate of freight at 0.92 per ton, per mile, as estimated in the last report of the Lake Shore and Michigan Southern Railway, and then assuming what is generally admitted, that the proportion of dead weight to paying freight is as 4 to 3, the cost of hauling the dead weight alone would not exceed 0.34 cent per ton, per mile, thus bringing down the estimate of our correspondent from 1¼ cents to 0.34, or about one-third of a cent, which reduces the estimated cost of hauling the assumed additional weight of standard axles for 1000 cars for five years, from $76,485, per year, to $27,525, and this the *Gazette* maintains would be more than covered by the saving in brass bearings for the same period, by the use of 3¾ journals. The error of our correspondent consists in his overlooking the fact that the cost of carrying freight also includes that of hauling the rolling-stock.

Shoulders at Wheel-Seats.

THERE seems to be some diversity of opinion in regard to the utility of shoulders on car-axles inside of the wheel-seat. The majority of railway mechanics—and, if we mistake not, a pretty large majority—agree in condemning abrupt shoulders, especially on that part of the axle, as being the incipient cause of breakage; while others maintain that a shoulder in some form is absolutely necessary inside the wheel-seat, to prevent the wheel from working inward and off the rail, in case it gets loose. Now it seems that both these troubles—loose wheels, and liability of the axle to break—are provided against in the form of the standard axle adopted by the Master Car-Builders' Association. It has no shoulder, abrupt or otherwise, inside the wheel-fit, unless a very slight increase in the diameter, not exceeding $\frac{1}{16}$ of an inch, may be regarded as such. This slightly increased diameter, extending a short distance, or to where the axle begins to taper toward the center, is all-sufficient to prevent a loose wheel from working inward and off the rail, while the danger of an abrupt shoulder is altogether avoided. Wheels have run with axles of this description under engine trucks and cars for ten years without causing any accident; indeed, it is impossible for the wheels to get off the rail unless from breakage or other cause with which the shoulder has nothing to do.

The Standard Axle-Box.

AFTER some unavoidable delay to which work of this description is liable, the standard axle-box is at length completed, and may be seen, together with the jaw or pedestal, at the rooms of the Association in this city. The drawings are also finished, and will be ready for delivery as soon as they can be lithographed, which will probably be early in November. The iron patterns will be made by Messrs. Townsend & Jackson, of Albany, who have the work already in hand.

This being an essential counterpart of the standard axle, much labor and care have been expended upon it by the committee who have had it in charge, aided by the advice and coöperation of other railway mechanics and members of the Car-Builders' Association, and it is confidently expected that it will meet the approval of railway men to such an extent as to secure its general adoption.

The Hitchcock Ventilator.

THIS device, sometimes called the "Carroll" Ventilator, has already received favorable notice in these columns. It has been adopted on various roads in different parts of the country, and especially in New-England, and gives entire satisfaction. The ventilators are located as usual in the car-roof, each with an outside projection facing alternately forward and backward, the former admitting the air and the latter affording an exit. The operation of the two sets is reversed when the direction of the car is changed, so that either set can be used for exhaust and supply. Dust and cinders are intercepted by shields set at right angles with the car side, while the air is forced into the car through a lateral opening. The faster the car moves, the greater is the quantity of air admitted and expelled, and as this takes place along the sides of the roof, the occupants are not exposed to any direct draught. The ventilators, once put in place, do not have to be changed, and they are noiseless in their operation. They provide for the main thing, which is ventilation, and have been approved by some of the most experienced car-builders in the country. See cuts illustrating same in advertisement on page 266.

Locomotive Snow-Broom.

MESSRS. M. C. ISAACS & CO., of Chicago, are supplying railroads with a broom made of steel wire, and designed to be attached to locomotives forward of the truck-wheels, for the purpose of keeping the rails clear of light snow and other obstructions. They are arranged so as to be lifted clear of the rails when their use is not required. They have been tried on many roads and are found to be both durable and serviceable. See advertisement, page 267.

WE are advised by Mr. J. H. Setchel, the Secretary of the Railway Master-Mechanics' Association, that the official report of the last annual meeting is now ready for distribution, and will be forwarded to the members of the association as fast as possible.

THE mammoth rolling-mill at Bethlehem will be started in a few weeks. It will employ 1000 men.

Wood and Iron-Working Machines.

MR. A. S. GEAR, the successor of A. S. & J. Gear & Co., of Boston, has just published a very attractive and complete catalogue of wood and iron-working machinery, in which upward of one hundred and fifty machines of these two classes are illustrated and described. Great care has been taken in its preparation to render it serviceable to purchasers. The new inventions that are constantly being made in this branch of mechanism, and the improvements in old machines, make it difficult for the buyer to determine which is the best. The compiler of this catalogue, by his long experience as a dealer, and also in the use of machinery, is able to discriminate between what is valuable and what is inferior, and thus to offer his patrons machines that may be relied on as the best and cheapest, regardless of the maker. No particular manufacturer is favored to the disadvantage of another. We have no room for a detailed specification, but a glance at the index shows that the list embraces all the approved and standard machines used in car-construction, including sawing, planing, boring, mortising, tenoning, moulding, and paneling machines, also lathes, drills, etc.

The catalogue, and other information pertaining to mechanism of almost any kind, may be obtained by applying to A. S. Gear, 56 Sudbury street, Boston.

The American Manufacturer and Trade of the West, published weekly at Pittsburg, Pa., is a valuable organ of the iron and steel manufacturing interests of the country, its ample pages containing a well-digested summary of manufacturing and trade-news, reliable market reports, and well-considered editorials on current topics. Price, $4 a year.

Progression is the title of a new semi-monthly paper published by Lee & Josselyn, St. Louis, and devoted to the railroad, manufacturing, iron, mining, financial, and transportation interests of the West and South. It is in quarto form, printed on tinted paper, and contains an interesting variety of original and selected matter pertaining to the topics named, special attention being given to the condition and progress of railroads and current railroad news. Price, $2 a year.

THE *Patent Right Gazette*, an illustrated monthly journal, published by the United States Patent Right Association, 94 Chambers st., New-York, gives special attention to new and valuable patents, and also contains a variety of original and miscellaneous matter. The illustrations in the October number are numerous and excellent. Price, including postage, $1.24 per annum.

The Penn Monthly, for October, contains a number of articles suited to readers of literary culture, the most noteworthy of which is entitled "Myths of the Thunderstorm." Trial by Jury is also discussed. A brief paragraph only is devoted to the panic, which will receive due attention in a subsequent number, when it will be treated with the fullness of detail it calls for.

THE Tanite Company, of Stroudsburg, Monroe County, Pa., have issued an illustrated pamphlet of 124 pages, which contains a great many useful facts and suggestions on the use of solid emery wheels and emery-grinding machinery. Manufacturers will find it a valuable manual of reference and information on this special subject.

A NEW ferry-boat for the ferry from Jersey City to New-York is being built at Burtis' ship-yard in South-Brooklyn. The new boat, which is to be named New-Jersey, is 224 feet long, 36 feet beam, and will be about 1000 tons register. It will be finished in the best style, and will be one of the finest ferry-boats on the river.

A NEW parlor-car was recently turned out of the Lawrence shops of the Boston and Maine Railroad, which is 48 feet long, and weighs only 15 tons. The car, which is very handsomely fitted, is to run between Boston and Portland.

S. W. REMER, formerly General Superintendent of the Atlantic Car-Works, Salem, is now at Detroit, Mich., superintending the construction of his patent compartment-car for cattle. These cars are thirty-six feet long, divided in four compartments for four cattle each, so arranged that food and water can be furnished by the action of a single lever operated on the top of the car. A car-load of stock can be fed in five minutes. By the use of these cars, cattle can be taken from Texas to Boston in a week's time, and avoid the great loss by shrinkage, which amounts to millions of dollars annually. It is stated that cattle will gain from ten to fifteen pounds per head on the trip, by being fed and watered regularly. Ten of these new cars will be sent out on trial in a few days.

A FIRELESS LOCOMOTIVE for street-cars was tested in Chicago the other day. The motive power consisted of a boiler eight feet long by three feet in diameter, and the usual machinery on a small scale. There was no fuel, no fire, no fireman. The steam was supplied for the round trip of six miles before starting. At the depot was a supply-boiler thirteen feet by three feet, in which steam was generated until 200 pounds pressure was indicated by the steam-gauge. The locomotive boiler was three fourths full of cold water. Instead of boiling this by means of a fire, and raising the pressure to the required height, the heat was introduced from the supply-boiler through an iron tube. This tube was connected with a tube in the locomotive boiler, the latter running under the water along the bottom of the boiler, and letting out the superheated steam as it was freed from the supply-boiler into the locomotive boiler. This steam rising through the cold water, permeated it and quickly raised its temperature to 170 degrees. With this supply of steam the engine drew a heavy four-horse car six miles at the rate of eighteen miles an hour, and had fifty-seven pounds of steam still remaining. The test was considered perfectly satisfactory.

A LARGE and complete drawing of James W. Evans's design for an elevated street railway for city transit, may be seen at the supply store of Vose, Dinsmore & Co., 32 Warren Street.

Facetiæ.

A PEORIA lady takes the train in this wise: She comes down to the depot in an express-wagon three hours before train time. She insists on sitting on her trunk, out on the platform, to keep it from being stolen. She picks up her reticule, fan, parasol, lunch-basket, small pot with a house-plant in it, shawl, paper bag of candy, bouquet, small tumbler, and extra vail, and chases hysterically after every switch-engine that goes by, under the impression that it is her train. She asks every body in the depot and on the platform when the train will start and where it will stand, and looking straight at the great clock, asks, "What time is it now?" Although the first at the depot, she is the last to get her ticket, and once on the cars, she sits to the end of her journey in an agony of apprehension that she has got on the wrong train and will be landed at some strange station, put in a close carriage, drugged, and murdered. She finally recognizes her waiting friends on the platform, leaves the car in a burst of gratitude, and the train is ten miles away before she remembers that her reticule, fan, parasol, lunch-basket, verbena, shawl, candy, tumbler, vail, and bouquet are on the car-seat where she left them, or in the depot at Peoria, for the life of her she can't tell which.

A CONCEITED snob who was so fond of fine clothes that he reveled in them by day and dreamed of them by night, visited a lady one evening, and removed his overcoat, etc., in the hall, preparatory to entering the parlor, when the lady heard him utter the following sensible words: Taking his overcoat and hanging it up, he said, "Hang there, you fifty-dollar overcoat!" Pulling off his gloves, and putting them on the table, "Lie there, you five-dollar gloves!" Placing his hat on the rack, "Hang there, you ten-dollar hat!" Putting his cane in the corner, "Stand there, you fifteen-dollar cane!" Then, entering the parlor, he was about to sit down, when the lady pulled the chair from under him, and as she left the room, said, "Lie there, you two-cent fool!" He has not agitated the bell-pull of that house since.

A STRANGER officiating at one of the churches at Belchertown, Mass., in the absence of the regular clergyman, gave a new version of the "Prodigal Son," representing him when leaving home as arrayed in the height of Parisian fashion, "in silk hat, broadcloth coat, kerseymeres, kid gloves, and French calf boots," and after a life of unparalleled extravagance, dissipation, and sin, his property being spent and his servants deserting him, he was seen one morning "out in the middle of a lot, on a rock, his silk hat knocked in, broadcloth out at the elbows, French calf boots out at the toes, kid gloves gone, hogs all around him, and he chewing the pods!"

As cool a person, under the circumstances, as was ever heard of, was a young nobleman who, in a frightful railroad accident, missed his valet. One of the guardians came up to him and said, "My lord, we have found your servant, but he is cut in two." "Aw, is he?" said the young man, with a Dundreary drawl, still with anxiety depicted on his countenance. "Will you be gwood enough to see in which half he has gwot the key to my carpet-bag?"

"Now, young people," said a professor of natural history to his class, "now, then, as to hens. A hen has the capacity of laying just six hundred eggs, and no more, and she finishes the job in just five years. Now, what is to be done with her after that?" "Cut her head off and sell her for a spring chicken!" exclaimed an urchin whose father dealt in poultry.

PINING, sickly women should go to Colorado if they want health and strength. Mrs. Prather was not able to sweep her own room when she lived in Ohio; but the other day, after living in Colorado one short year, she chased her husband half a mile with a pitchfork.

AN economical bridal pair at Springfield, Ill., partook of their wedding feast, composed of smoked herring, crackers and cheese, spread out on the head of a barrel. A meddlesome crowd around the door was dispersed by the bride, who exclaimed, "What'n thunder you lookin' at?"

SYDNEY SMITH was good-natured and tolerant; but when Lord Melbourne, whom he had gone to see upon some business, interlarded his conversation with much cursing and swearing, he quietly remarked, "Let us assume that every body and every thing are damned, and proceed to the subject."

AN eccentric old fellow, who lives alongside of a graveyard, was asked if it was not an unpleasant location. "No," said he, "I never jined places in all my life with a set of neighbors that minded their own business so stiddy as they do."

A FATHER, in consoling his daughter who had lost her husband, said: "I don't wonder you grieve for him, my child. You will never find his equal." "I don't know as I can," responded the sobbing widow; "but I'll do my best!" The father went home comforted.

A LITTLE boy was sent to a shop for some eggs. Before reaching home, he dropped them. In answer to his mother, who asked, "Did you break any?" he replied, "No, I didn't break any, but the shells came off from some of them."

A CONNECTICUT woman was once bereft of the faculty of speech by being hit with a snowball, and many married men in that part of the country have been heard to remark that, after all, winter has advantages not afforded by any other season.

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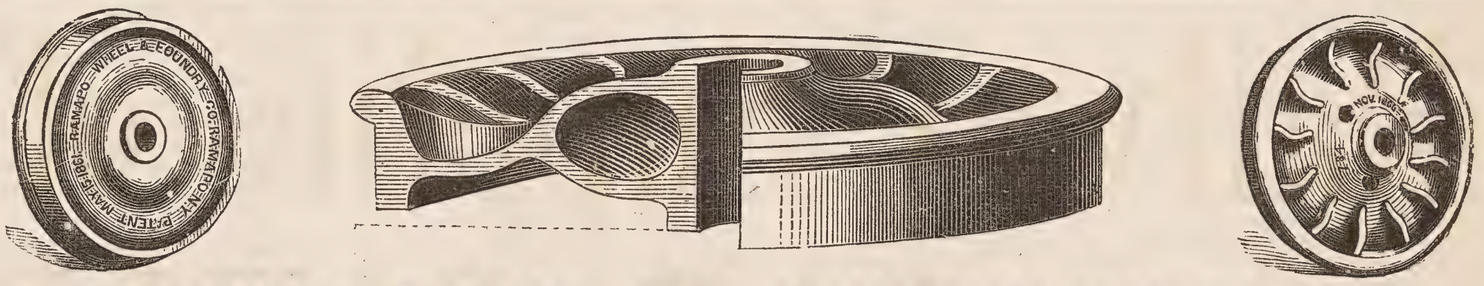

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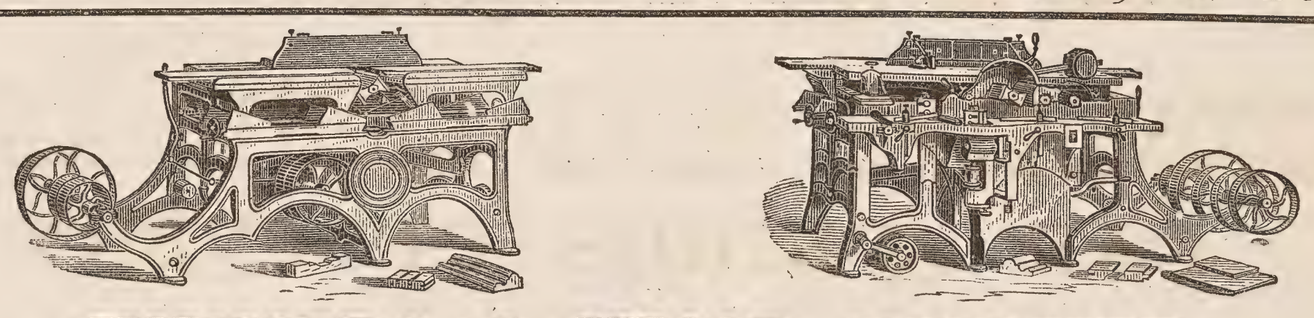

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Camden & Atlantic	Rufus Hill	S. Wills	Camden, N. J.
Canada Southern	C. E. Benton	C E. Benton	St. Thomas, Canada.
Carolina Central	W. A. Gill	Thos Myers	Laurinburg, N. C.
Catawissa	A. J. Prescott	C. D. Ellis	Catawissa, Pa
Catasauqua & Fogelsville	Thomas Evans	Chas. J. Holbach	Catasauqua. Pa.
Carrolton & Oneida	M. T. Wiggins		Carrolton, Ohio.
Charleston & Savannah	H. T. Calder		Charleston, S C
Chesapeake & Ohio	W. G. Freeman	J. N. King	Richmond, Va.
Chesapeake & Ohio	§T. J. Hamer	H. C. Bossinger	Huntingdon, W. Va.
Cheraw & Darlington	D. W. Haines	A. M. Corrie	Florence, S. C.
Champlain Trans. Co.	H. T. Calder		Burlington, Vt.
Cheshire & Ashuelot	F. A. Perry	F. A. Perry	Keene, N. H.
Charlotte, Columbia & Augusta	Robert King	J. Q. Seats	Columbia, S. C.
Chicago & North-western	§Geo. W. Tilton	Thomas Hull	Chicago, Ill.
Wiscon. Mad. & Mill. Divis		Henry Hull	Fond du Lac, Wis.
Galena Division	D. Manning	Hugh Gray	Chicago, Ill.
Wiscon. Mad. & Mill. Divis	T. B. Tilton		Chicago, Ill.
Iowa Division	C. C. Elliott	William Campbell	Clinton, Iowa.
Peninsula Division			Escanaba, Mich.
Chicago & Alton	John A Jackman	R. Reniff	Bloomington, Ill.
Chicago, Burlington & Quincy	‡Geo. Chalender		Burlington, Iowa.
Eastern & Middle Division	E. T. Prindle	W. W. Wilcox	Aurora, Ill.
Galesburg Division	Wm. Wilson	J. D. Besler	Galesburg, Ill.
Quincy Division	Joel West.		Cresson, Iowa.
Burlington Division	S. E. Burtch		Burlington, Iowa.
Buda Division	P. R. Sutton		Buda, Ill
Chicago, Clinton & Dubuque	P. R. Sutton		Dubuque, Iowa.
Chicago, Dubuque & Minnesota	P. R. Sutton		Dubuque, Iowa.
Chicago, Rock Island & Pacific	T. B. Twombly	B. K. Verbryck	Chicago, Ill.
Chicago & Michigan Lake Shore	Wm. L. Fitch	Oliver Udell	St. Joseph, Mich.
Chicago, Danville & Vincennes	A. B. Bedell	W. H. Dunham,	Danville, Ill.
Chicago, Danville & Vincennes	J. M. Sanborn		Chicago, Ill.
Chicago & Canada Southern	§§J. Johann		Trenton, Mich.
Cincinnati, Wabash & Michigan	E. M. Porter		Wabash, Ind.
Cleveland, Col., Cin., & Indianapolis	‡L. S. Young	William F. Smith	Cleveland, Ohio.
Indianapolis Division	L. W. Durgin		Galion, Ohio.
Indianapolis Division		R. Attridge	Indianapolis, Ind.
Cincinnati Divison		D. Carmichael	Delaware, Ohio.
Columbus Division	F. G. Kaufholz	Wm. Cleve	Cleveland, Ohio.
Cleveland and Pittsburg	N. E. Chapman	A. Steinbrunner	Cleveland, Ohio.
Cleveland, Mt Vernon & Delaware	J. W. Holloway	J. W. Holloway	Akron, Ohio.
Cincinnati, Hamilton & Dayton	William Cullen	W. H. H. Allison	Cincinnati. Ohio.
Cincinnati & Indianapolis Junction	W. McKinzie	Edwin Beeny	Indianapolis, Ind.
Cincinnati, Lafayette & Chicago	Charles E. Gore		Lafayette, Ind.
Cincinnati & Muskingum Valley	Leroy Kells	Daniel Jewell	Lancaster, Ohio.
Cincinnati. Sandusky & Cleveland	John Y. Beattie	John Y. Beattie	Sandusky, Ohio.
Cobourg, Peterboro & Marmosa	Wm. Polson		Cobourg, Canada.
Columbus, Chicago & Indiana Central	(See Pitts. Cinn. & St. Louis)		
Concord	Chs. L. Eastman	M. W. Dickerman	Concord, N. H.
Concord & Portsmouth	C. L. Eastman	M.W. Dickerman	Concord, N. H.
Concord & Claremont	J. N. Lander	A. Langmaid	Concord, N. H.
Connecticut River	§Wm. H. Stearns		Springfield, Mass.
Connecticut Valley	C. W. Hollister	N. A. Smith	Hartford, Ct.
Connecticut Western	N. Slingland		Hartford, Ct.
Contoocook River			Concord, N. H.
Conn. & Passumpsic Rivers	Horace Alden	Horace Alden	Lyndon, Vt.
Cumberland Valley	A. S. Hull	C. W. Nitterhouse	Chambersburg, Pa.
Cumberland & Pennsylvania	W. L. Jordan	J. W. Sauerbach	Mt. Savage, Md.
Central of Georgia	D. D. Arden	C. C. Millar	Savannah, Ga.
Central of New-Jersey	*T. W. Peeples	George Hackett	Elizabethport, N. J.
Lehigh & Susquehanna Div.	L. C. Brastow	L. C. Brastow	Wilkesbarre, Pa.
Central Branch Union Pacific	Wm D. Rowley.		Atchison, Kansas.
Central R. R. of Iowa	F. B. Woodruff	T. L. Seevers	Marshall, Iowa
Central Pacific	A. J. Stevens	Benjamin Welch	Sacramento, Cal.
D			
Dakota & Southern	Jas. Whitney	A. A. Meckling	Sioux City, Iowa.
Davenport & St. Paul's	George Gregg		Peoria, Ill
Dayton & Union	A. J. Keenan	J. F. Feicht	Dayton, Ohio.
Danbury & Norwalk	Charles A. Craig	C. A. Craig	Danbury, Ct.
Dayton & Michigan	William Cullen	W. H. H. Allison	Cincinnati, Ohio.
Denver & Rio Grande	John Greenwood		Denver, Col.
Delaware, Lackawanna & Western	Walter Dawson	Robert McKenna	Scranton Pa
Morris & Essex Division	W. H. Lewis	L S. Barber	Hoboken, N. J.
Des Moines Valley	James Lamb	R. E. Smith	Keokuk, Iowa
Detroit, Ft. Wayne & Logansport	W. A. Carpenter		Bankers, Mich.
Detroit & Milwaukee	Andrew Wilson		Detroit, Mich.
Detroit, Lansing & Lake Michigan	Tho. G. Roberts		Detroit, Mich.
Delaware & Hudson Canal Co	James Dickson	Thomas Orchard	Carbondale, Pa.
Rensselaer & Saratoga Div.	John Dikeman		Troy, N. Y.
Dorchester & Delaware			Cambridge, Md.
Dubuque South-western	J. M. Smith	J. M. Smith	Farley, Iowa.
Dutchess & Columbia	W. G. Vanbuskirk	H. A. Webster	Fishkill, N. Y.
Dunkirk, Allegheny Val. & Pittsburg	J. C. Haggett	J. C. Haggett	Dunkirk, N. Y.
E			
Eastern		J. P. Somerby	Salem, Mass.
Eastern	John Thompson		East-Boston. Mass.
Eastern Kentucky	D. L. Weaver	D. L. Weaver	Riverton, Ky.
East-Tennessee & Virginia	Eli Hixon	Jos. Armbruster	Knoxville. Tenn.
East-Tennessee & Georgia	Eli Hixon		Knoxville, Tenn.
East Pennsylvania		Samuel Reeves	Reading, Pa
Elizabethtown and Paducah	W D. Robb	T. A. Cordrey	Elizabethtown, Ky.
Erie Railway	§§Howard Fry		Susquehanna, N. Y
Erie Railway	‖Robert Wallace		Susquehanna, N. Y.
Erie Railway	‖V. Blackburn	C. A. Smith	Jersey City. N. J.
Erie Railway	J. G. Hubbard	M. Wilder	Buffalo, N. Y.
Erie Railway	‖W. E. Cooper	N. D. Ogden	Hornellsville, N. Y.
Erie Railway		W. E. Rutter	Elmira, N. Y
Evansville & Crawfordsville	John L. White	Joseph Stiker	Evansville, Ind.
Evansville, Henderson & Nashville	H. M. Smith	W. H. H. Price	Henderson, Ky
European & North Am. (of Maine)	A. O. Bailey	J. H. Brown	Oldtown, Maine.
Erie & Pittsburg	G. J. Parkin	G. J. Parkin.	Erie, Pa.
Evansville, Terre Haute & Chicago			Terre Haute, Ind.
F			
Flushing & North Side	Wm. La Suer		College Point, L. I.
Florida	Ezra Gray	G. Hernandez	Fernandina, Fla.
Flint & Pere Marquette	Sanford Keeler	Sanford Keeler	East-Saginaw, Mich.
Fitchburg	Geo. A. Coledge	Enos Varney	Charlestown, Mass.
Fitchburg & Worcester	John Webster	Samuel Stevens	Fitchburg, Mass.
G			
Galveston, Harrisburg & San Antonio	Jno. G. Coulon		Galveston, Texas.
Gilman, Clinton & Springfield	W. B. McKenna		Springfield, Ill.
Grand Tower & Carbondale	Hugh Smith	Hugh Smith	Grand Tower, Ill.
Grand Trunk		Warren Noyes	Gorham, Me
Grand Trunk	†Richard Eaton	J. W. W. McWood.	Montreal, Canada.
Grand Trunk			Sherbrooke, Can.
Grand Trunk		B. J. Mitchell	Portland, Me.
Galveston, Houston & Henderson	Sol. Bills	Wm. Macbeth	Galveston, Texas.
Grand Rapids & Indiana	J. M. Boon		Fort Wayne. Ind.
Great Western of Canada	†Wm. A. Robinson	F. Childs	Hamilton, Canada.
Georgia	William Hardman.	T. M. Preval.	Augusta, Ga.
Green Bay & Lake Pepin	J. H. Erwin		Green Bay, Wis.
Greenville & Columbia	J. T. Price	J. T. Price	Helena, S. C.
H			
Harlem Extension	George W. Blanchard		Rutland, Vt.
Harlem Extension		C. S. Clapp	Bennington, Vt.
Hanover Branch	John J. Bingley	Henry Britcher	Hanover, Pa.
Hannibal & St. Joseph	L. W. Towne		Hannibal, Mo.
Hartford, Providence & Fishkill	Edwin Garfield	V. D. Perry	Hartford, Ct.
Hackensack & New-York	Abra'm Angausen		Hackensack. N. J.
Housatonic	C. R. Morris	J J. Ferris	Bridgeport, Ct.
Houston & Texas Central	§W. H. Purdy	W. H. Purdy	Houston, Texas.
Houghton & Ontonagon			L'Anse, Mich.
Houston Tap & Brazoria	T. J. Shellhorn	T. J. Shellhorn	Houston, Texas.
Huntington & Broad-Top Mountain	J. Salisbury	M. Tellerhoof	Saxton, Pa.
Hempfield	T. Marsh		Wheeling, Va.
I			
Indianapolis, Cincinnati & Lafayette	J. S. Patterson	S. Griffith	Cincinnati, Ohio.
Indianapolis, Peru & Chicago	John McKenna	John McKenna	Peru, Ind.
Illinois Central	**S. J. Hayes	H. O. Wadlie	Chicago, Ill.
Chicago Division	Henry Schlacks		Chicago, Ill.
South Division	David Oxley		Centralia, Ill.
North Division	J. B. Edams		Amboy, Ill.
Iowa Division	Thomas W. Place		Waterloo, Iowa.
Iowa & Missouri State Line			Farmington.Iowa.
Iron	Perry Scott	Clem. Roetling	Ironton, Ohio.
Indianapolis & St. Louis	A. T. Sanford	R. B. More	Mattoon, Ill.
Indianapolis, Bloomington & Western	Tho. V. Losee	A. J. Allen	Urbana, Ill.
Ionia & Lansing	H. Loughlin		Lansing, Mich.
Indianapolis & Vincennes	A. E. Allcott		Indianapolis, Ia.
International & Great Northern	A. H. DeClercq	F. M. Looney	Houston, Texas.
Intercolonial	Wm. Whitney	Edw. Shaffer	Moncton, N. B.
Ithaca & Athens	F. A. Brown		Ithaca, N. Y.
J			
Jeffersonville, Madison & Indiana	Reuben Wells		Jeffersonville, Ind.
Junction & Breakwater	J. A. Maguire		Lewes, Del.
K			
Kansas Central	John Davis		Leavenworth, Kan.
Knox & Lincoln	§§E. R. Hamlin	Benj. Soule	Bath, Maine.
Kentucky Central	J. R. Ledyard	J. L. Hackathorn	Covington, Ky.
Knoxville & Charleston			Knoxville, Tenn.
Kansas Pacific	**L. H. Waugh		Wyandotte, Kansas.
Denver Pacific Div	**L. H. Waugh		Wyandotte, Kansas.
Denver & Boulder Valley Div	**L. H. Waugh		Wyandotte, Kansas.
Junction City & Ft. Kearney Div	**L. H. Waugh		Wyandotte. Kansas.
Arkansas Valley Div	**L. H. Waugh.		Wyandotte, Kansas.
Kalamazoo, Allegan & Grand Rapids			Kalamazoo, Mich.
Kansas City, St. Joseph & Council Bluff	§§H. L. Cooper	H. L. Cooper	St. Joseph, Mo.
King's Mountain	E. Thomas.	E. Thomas.	Chester, S. C.
L			
Lake Erie & Louisville	John Pero		Fremont, Ohio.
Lackawanna & Bloomsburg	Chas. Graham	Chas. Graham	Kingston, Pa.
Lehigh Valley	John I. Kinsey		South-Easton, Pa.
Lehigh Valley	P. Hofecker	E. R. Brown	Weatherly, Pa.
Lehigh Valley	A. Mitchell	Mauch Chunk, Pa.	Delano, Pa.
Lehigh Valley	D. Clark		Hazleton, Pa.
Leavenworth, Lawrence & Gal	S. M. Philbrick		Lawrence, Kansas.
Lexington & Big Sandy	Fred. Weber	R. Brainard	Ashland, Ky.
Little Rock & Fort Smith	D. R. Wing	D. R. Wing	Argenta, Ark.
Little Miami	J. H. Setchel.		Cincinnati, Ohio. ‖
London & Port Stanley			London, C. W.
Louisville, New-Albany & Chicago	Geo. Ruhlandt	Geo. Helfrich	New-Albany, Ind.
Long Island	Chs. A. Thompson.	Ellis Dodge	Hunter's Point, L.I.
Louisville, Cincinnati & Lexington	E. B. Gibbs	S. S. Pilson	Louisville, Ky.

Railroad.	*Master-Mechanic.*	*Master Car-Builder.*	*Residence.*
Louisville & Nashville	†Thatcher Perkins		Louisville, Ky.
Louisville & Nashville	D. P. Rennie	Isaac M. Owens	Louisville, Ky.
Louisville & Nashville	Jas. Montgomery		Bowling Green, Ky.
Nashville & Decatur Division	John Skidmore		Nashville, Tenn.
South & North Ala. Div.	Thos Jeffers	W. L. Gude	Birmingham, Ala.
South & North Ala. Div	C. H. Beale		Montgomery, Ala.
Memphis & Ohio Div.	Thos. Walsh	R. M. C. Parker	Memphis, Tenn.
Lake Shore & Michigan Southern	‡James Sedgley	††John Kirby	Cleveland, Ohio.
Michigan Southern Division	Geo. W. Stevens		Elkhart, Ind.
" " "		S. S. Knapp	Adrian, Mich.
Toledo Division	Geo. H. Tier	Frank O. Bray	Norwalk. Ohio.
Erie Division	L. O. Gassett	J. Withyecombe	Cleveland Ohio.
Buffalo Division	W. L. Wallace	A. C. Robson	Buffalo, N. Y.
Lake Shore & Tuscarawas Valley	Charles Fellows	J. D. McIlwain	Black River, Ohio.
Lake Ontario Shore	J. C. Schermerhorn	J. C. Schermerhorn	Oswego, N. Y.
M			
Marquette, Houghton & Ontonagon	A. P. Burroughs	H. D. Lyons	Marquette, Mich.
Macon & Augusta			Macon, Ga.
Maine Central	J. W. Philbrick	J. W. Philbrick	Waterville, Me
Androscoggin Div	Ira K. Russell		Farmington, Me.
Portland & Kennebec Div	John Ellis		Augusta, Me.
Maine Central Division	John F. Merrill		Waterville Me.
Macon & Western	D. M. Gogul	James A. Knight	Macon, Ga
Manchester & Lawrence	Chas. L. Eastman	M. W. Dickerman	Concord, N. H.
Marietta & Pittsburg	W. J. Adams		Marietta, Ohio.
Maryland & Delaware	J. L. Caldwell		Easton, Md.
Macon & Brunswick	M. Thornton	M Thornton	Macon, Ga.
Marietta & Cincinnati	E. Bosley	E. Bosley	Chillicothe, Ohio.
Memphis & Little Rock	Tho. Rennells	P. Twitchell	Argenta, Ark.
Memphis & Charleston	A. Ross	A W. Drew	Memphis, Tenn.
Memphis & Charleston	H. N. Burford	Fabien Varin	Huntsville, Ala.
Mineral Point	Robert Hay	Robert Hay	Mineral Point, Wis.
Mississippi & Tennessee	Geo. Haszinger	J. Riny	Memphis, Tenn.
Mississippi Central	Henry Gibbon	John E. Becton	Water Valley, Miss
Maryland & Delaware	Samuel Peters		Greensboro, Md.
Mississippi, Gains. & Tus			Gainsville, Ala.
Midland Pacific			Nebraska City, Neb.
Milwaukee & Northern		W. J. F. Liddell	De Pere, Wis.
Milwaukee & St. Paul	T. S. Davis	Wm. E. Kittredge	Milwaukee, Wis.
Milwaukee & St. Paul		John Baillie	Milwaukee, Wis.
Milwaukee & St. Paul	J. Pattee	D. F. Wilson	Minneapolis, Minn.
Hastings & Dakota Division	C. C. Clements		Hastings, Minn.
Michigan Central	‡A. P. Farrar		Jackson, Mich.
Michigan Central		J. B. Sutherland	Detroit, Mich.
Grand River Valley Division		James Potts	Jackson, Mich.
J'kson, Lans'g & Saginaw Div.	Andrew Wilson	Andrew Wilson	Jackson Mich.
Montgomery & West-Point	J. McVey	J. T. Daniels	Montgomery, Ala.
Montgomery & Eufaula	I. W. Hewlet	T. J. Burton	Montgomery, Ala.
Mobile & Montgomery	James McFarland	L. Barham	Montgomery, Ala.
Mobile & Girard	C. D. Wall		Girard, Ala.
Mobile & Ohio	L. J. Fleming	John McHugh	Mobile, Ala.
	B. S. Skates	Jacob Huy	Whistler, Ala.
Morgan's Louisiana & Texas	N. Tilton	Wm. O'Brien	Algiers, La.
Missouri River, Fort Scott & Gulf	John S. McCrum		Kansas City, Mo.
Missouri River, Fort Scott & Gulf		Josiah Stahl	Wyandotte, Kan.
Missouri, Kansas & Texas		J. Townsend	Sedalia, Mo.
Missouri, Iowa & Nebraska	Wm. Adams		Alexandria, Mo.
Missouri Pacific		E. Martin	St. Louis, Mo.
N			
Nashville & Chattanooga	John U. Eastman	J. G. Sawyer	Nashville, Tenn.
New-Bedford & Taunton	Robert Chase	Robert Chase	New-Bedford, Mass.
New-Canaan			New-Canaan, Ct.
New-Brunswick & Canada	Tho. Armstrong	G. Houlton	Fredericton, N. B.
New-Haven & Northampton	Henry Fox	Henry Fox	New-Haven, Ct.
New-York, Kingston & Syracuse	A. Q. Mackenbush	G. Dikeman	Syracuse, N. Y.
New-York & Harlem	Wm. M. Strong	Leander Garey	New-York.
New-York Central & Hudson River			
New-York Central Division	‡G. B. Van Vorst	††Joseph Jones	West-Albany, N. Y.
New-York Central Division	Henry Watkeys		Syracuse, N. Y.
New-York Central Division	Amos Gould		Rochester, N. Y.
New-York Central Division	Jas. Butman	Wm. Johnson	Buffalo, N. Y.
New-York Central Division	S. L. White	George Rowe	Niagara Falls, N. Y.
Hudson River Division	‡Wm. Buchanan	John McKenna	New-York City.
Hudson River Division	R. Greenalch	J. J. Conaghty	E. Albany. N. Y.
New-York, Boston & Montreal		H. A. Webster	Dutchess Junc., N.Y.
New-York & Oswego Midland	‖Wm. H. Griggs	Wm. H. Griggs	Oswego, N. Y.
Eastern Division	J. F. Sechler	J. A. Read	Middletown, N. Y.
Middle Division	C. E. Scruton		Norwich, N. Y.
Northern Division	Edward Van Vleck	T. D. Day	Oswego, N. Y.
New-York & New-England	Geo. E. Boyden	Elias E. Pratt	Boston, Mass.
New-York, Providence & Boston	Jas. H. Anderson	Jas. H. Anderson	Providence, R. I.
New-York, New-Haven & Hartford	§§H. Kittendorf	James Denver	New-Haven, Ct.
New-York, New-Haven & Hartford	J. O. Chapman	F. Leppens	Hartford, Ct.
New-Jersey Southern	Rufus Blodgett.		Manchester, N. J.
New-Haven & Derby			New-Haven, Ct.
New-Lisbon			Leetonia, Ohio.
New-Orleans & Ohio	John R. Jordan	John R. Jordan	Paducah, Ky.
New-Orleans, Jackson & Gt. Northern	N. Greener	N. Greener	New-Orleans, La.
New-Haven, Hartford & Springfield			Hartford, Ct.
Naugatuck	Henry Hanford	George. W. Gray	Bridgeport, Ct.
North-Carolina	Rufus D. Wade	B. G. Sergeant	Co. Shops, N. C.
North-Louisiana & Texas	C. H. Tull		Monroe, La.
New-Orleans, Mobile & Texas	J. R. White	D. C. Roland	Mobile, Ala.
Northern Central	C. M. Lewis		Baltimore, Md.
Northern Central		G. W. Demarest	York, Pa.
North-Lebanon		Henry B. Oves	Lebanon, Pa.
North-Pennsylvania	Franklin Roop	Franklin Roop	Philadelphia, Pa.
North-Eastern	D. W. Haines	A. M. Corrie	Florence, S. C.
Northern	James W. Lander	Albert Langmaid	Concord, N. H.
Northern of New-Jersey	T. W. Demorest		New-York.
Norwich & Worcester	Richard Colburn	G. R. Bentley	Norwich, Ct.
Northern of Canada	P. Clark.	P. Clark	Toronto, Can.
Northern Pacific	H. A. Towne		St. Paul, Minn.
Minnesota Division		W. S. Heathcote	Brainerd, Minn.
Lake Superior & Miss. Division	W. McFarland	John Hill	St. Paul, Minn.
Dakota Division	C. W. Rossiter		Fargo, D. T.
Pacific Division	J. F. Curtis		Kalama, W. T.
O			
Old Colony & Newport	J. K. Taylor	A. Gleason	Boston, Mass.
Oil City & Pithole	George Thompson		Pithole, Pa.
Oil Creek & Alleghany River	J. S. McElroy	Jacob Williams	Corry, Pa.
Oil Creek & Alleghany	H. J. Bookhammer	John Monks	Oil City, Pa.
Ohio & Mississippi		G. Hibbard	Cochran, Ind.
East Division	A. Thompson		Cochran, Ind.
West Division	H. Elliott	Chas. Hyatt	East St. Louis, Ill.
Oregon & California	§§J. Brandt.		Portland, Oregon.
Owensburg & Russellville	J. R. Osborne		Owensburg, Ky.
P			
Paducah & Memphis	J. D. Linning		Paducah, Ky.
Painesville & Youngstown	G. R. Crane		Painesville, Ohio.
Paris & Decatur	John G. Clifford	G. Clifford	Paris, Ill.
Panama	Chas. E. Stewart	J. G. Wilson	Aspinwall, N. G.
Pacific of Missouri	§§John Hewitt	John Hewitt	St Louis, Mo.
Pennsylvania	§§F. Thomson		Altoona, Pa.
Pennsylvania	H. D. Garrett	I. W. Van Houten	W. Philadelphia, Pa.
Pennsylvania	E. L. Caum	Samuel W. Myers	Harrisburg, Pa.
Pennsylvania	G. W. Strattan	John P. Levan	Altoona, Pa.
Pennsylvania	D. O. Shaver	R. S. Ramsey	Pittsburg, Pa.
New-Jersey Division	John Headden	David H. Baker	Jersey City, N. J.
West-Penn. Division	C. B. Street	James F. Elder	Blairsville, Pa.
Philadelphia, Wilmington & Baltimore	S. A. Hodgman	Wm. T. Worth	Wilmington, Del.
Philadelphia & Baltimore Central	S. D. Danfield	Samuel D. Danfield	Chester, Pa.

Railroad.	*Master-Mechanic.*	*Master Car-Builder.*	*Residence.*
Philadelphia and Erie	Martin Walls		Sunbury, Pa.
	W. L. Forster		Renovo, Pa.
	W. L. Holman		Kane, Pa.
	W. T. Smith.		Erie, Pa.
	§§T. N. Ely		Erie, Pa.
Philadelphia & Reading	L. B. Paxson	Aaron Steinbach	Reading, Pa.
Germantown & Norris'n Div.	Jackson Richards		Philadelphia, Pa.
Pittsburgh, Cincinnati & St. Louis			
Pittsburgh & Columbus Division	E. Pierce		Dennison, Ohio.
Pittsburgh & Columbus Division		James McGee	Steubenville, Ohio.
Little Miami Division		M. P. Ford	Columbus, Ohio.
Little Miami Division	J. H. Setchel		Pendleton, Ohio.
Col., Cin. & Ind. Division	Robert Curtis	Tho. Chamberlain	Columbus, Ohio.
Col., Cin. & Ind. Division	Geo. H. Prescott	Geo. H. Prescott	Logansport, Ind.
Peoria & Rock Island	Geo. Gregg		Peoria, Ill.
Pittsburg & Connellsville	J. M. Leech	J. E. Gamsel	Pittsburg, Pa.
Pittsburg, Fort Wayne & Chicago	S. M. Cummings	John Marquis	Allegheny, Pa.
Pittsburg, Fort Wayne & Chicago	J. M. Boon	Israel Lee	Fort Wayne, Ind.
Pittsburg, Fort Wayne & Chicago		J. J. Kirkland	Crestline, Ohio.
Pittsburg, Washington & Baltimore	A. S. Kinsey		Pittsburg, Pa.
Peoria, Pekin & Jacksonville	R. F. Hurd	Jas. J. Doyl	Pekin, Ill.
Peninsular	T. G. Templeton		Battle Creek, Mich.
Portland & Rochester	John G. Brady	John G. Brady	Portland, Me.
Portland & Oxford Central	Geo. W. Battles	Geo. W. Battles	Buckfield, Me.
Portland, Saco & Portsmouth	John Donnell		Portland, Me.
Port Royal	C. W. Furber	E. Hubard	Port Royal, S. C.
Port Hope, Lindsay & Beaverton	H. G. Taylor	H. G. Taylor	Port Hope, Can.
Port Huron & Lake Michigan	R. C. Stewart	R. C. Stewart	Port Huron, Mich.
Providence, Warren & Bristol	Rufus Smith	J. Brightman	Bristol, R. I.
Portsmouth, Gt. Falls & Monmouth	James Tucker	E. Fall	Union Village N H.
Petersburg & Weldon	R. B. Andrews	Alex. Wright	Petersburg, Va.
Providence & Worcester	Joseph Kelly	Olney L. Smith	Providence, R. I.
Poughkeepsie & Eastern	John L. Driscoll	Jerry Wigg	Poughkeepsie, N. Y.
Q			
Quincy, Missouri & Pacific	Geo. Adams		Quincy, Ill.
R			
Raleigh & Gaston	J. B. Gayle	J. B. Gayle	Raleigh, N. C.
Richmond, Fredericksburg & Potomac	H. Kuhn	W. H. Trainham	Richmond, Va.
Richmond, Danville & Piedmont	John McFarland	H. Longest	Richmond, Va.
Richmond & Petersburg	John O'Brien	H. L. Carter	Richmond. Va.
Richmond & York River	C. H. Harris	J. L. Thompson	Richmond. Va.
Rive De Loup	P. A. Logan	C. R. McKinnin	Fredericton, N. B.
Rome, Watertown & Ogdensburg	Abram Klohs	H. H. Sessions	Rome, N. Y.
Reading & Columbia	B. Van Lew		Columbia, Pa.
Rome, Georgia	O. W. Harbin	O. W. Harbin	Rome, Ga.
Rochester & Genesee Valley	M. E. Brown	M. Wilder	Buffalo, N. Y.
Rockford, Rock Island & St. Louis	Joseph Elder	T. F. Nolte	Beardstown, Ill.
S			
Saginaw Valley & St. Louis	W. S. Thompson		Saginaw, Mich.
Selma, Marion & Memphis	R. H. Anderson		Marion, Ala.
Southern Pacific of California	J. P. Wilson	F. N. Bellisle	San Francisco. Cal.
St. Croix & Lake Superior			New-York City.
St. Croix & Penobscot	Edward Bolton	A G. Page	Milltown, Me.
St. Lawrence & Ottawa	Calvin Dame	Calvin Dame	Prescott. Canada.
St. Louis & Iron Mountain	O. A. Haynes	Oscar Doolittle	Carondelet, Mo.
St. Joseph & Denver City	E. Sleppy		St. Joseph. Mo.
San Antonio & Mexican Gulf	W. T. Bingham		Victoria, Texas.
South Side of Long Island	Geo. H. Griggs	M. Heitzman	Williamsburg, L. I.
St. Paul & Pacific	J. C. Monroe	T. W. Heathcote	St. Paul, Minn.
St. Paul & Sioux City	F. C. Butterfield	J. W. Lydic	Shakopee, Minn.
St. Louis, Vandalia, T. Haute & Ind.	C. R. Peddle	H. Kirmse	Terre Haute, Ind.
Indianapolis Division	Wm. Riley		Terre Haute, Ind.
Vandalia Division	A. J. Sanborn.		Effingham, Ind.
South-Carolina	W. B. Smith	John Reed	Charleston, S. C.
Southern Central	Chas. G. Brown	H. Mooney	Auburn, N. Y.
Southern Minnesota	James Waters		Wells, Minn.
South-Western of Georgia	C. D. Wall		Columbus, Ga.
South-Western of Georgia	D. M. Gogul	James A. Knight	Macon, Ga.
South Shore	Warren E. Ray		Cohasset, Mass.
Stanstead, Shefford & Chambly	W. H. Smith		Waterloo, C. E.
Seaboard & Roanoke	§E. G. Ghio	J. B. Pendleton	Portsmouth, Va.
Stonington & Providence	J. H. Anderson	J. H. Anderson	Providence, R. I.
Selma & Gulf	Wm. T. Daughtrey		Selma, Ala.
Selma, Rome & Dalton	A. G. Maynes	W W. Peirce	Selma, Ala.
Sioux City & Pacific	C. H. Foster		Missouri Val., Iowa.
Spartanburg & Union	J. N. Benner	Jacob Rice	Union C. H., S. C.
Sheboygan & Fond du Lac	A. F. Wallace.	A. F. Wallace	Sheboygan, Wis.
Sullivan & Erie			Tonawanda, Pa.
Syracuse, Binghamton & New-York	H. H. Dawson	David Burling	Syracuse, N. Y.
Syracuse Northern	W. Garrison	L. W. Smith	Syracuse, N. Y.
Sycamore & Cortland			Sycamore, Ill.
St. Louis, Alton & Terre Haute	**Beriah Warren		St. Louis, Mo.
St. Louis & South-Eastern	‖L. B. Salisbury		Mt. Vernon, Ill.
Nashville Division	H. M. Smith	J. J. Casey	Earlington, Ky.
St. Louis, Kansas City & Northern	H. S. Smith	C. S. Buck	Moberly, Mo.
T			
Taunton Branch	W. M. Parks	J. G. Codding	Taunton, Mass.
Tioga	Peres Bonny	D. H. Stratton	Blossburg, Pa
Texas & New-Orleans	R. B. Baer		Houston, Texas.
Tennessee & Pacific	William McKeand	William McKeand	Nashville, Tenn.
Toledo, Wabash & Western	R. B. Small	**G. W. Cushing	Fort Wayne, Ind.
Toledo, Wabash & Western		David Hoit	Toledo. Ohio.
Toledo, Wabash & Western		T. G. Gorman	Springfield, Ill.
Toledo, Peoria & Warsaw	W. O. Hewitt	R. M. Hemphill	Peoria, Ill.
Troy & Boston	Foster Church	R. V. Coon	Troy, N. Y.
Toronto, Grey & Bruce	Wm. Bowstead		Toronto, Can.
Toronto & Nipissing	J. Haggus		Toronto, Canada.
U			
Union Pacific	§I. H. Congdon	Geo. E. Stevens	Omaha, Nebraska.
Utah Central	Thos. Pierpont	Edward Cox	Salt Lake City.
Utica & Black River	Wm. E. Granger	David James	Utica, N. Y.
Utica, Chenango & Susquehanna	C. H. Brown		Utica, N. Y.
V			
Vicksburg & Brunswick	James Boon	J. A. Knight	Eufaula, Ala.
Vicksburg & Meridian	Jas. B. Browne		Vicksburg, Miss.
Vineland			Vineland, N. J.
Vermont Central	J. M. Foss	J. M. Foss	St. Albans, Vt.
Rutland Division	N. L. Davis		Rutland, Vt.
New-London Northern Division	J. W. Dow	S. W. Caulkins	New-London, Ct.
Ogdensburg & L. Champlain Div.	William A. Short	J. R. Ames	Malone, N. Y.
Vermont & Massachusetts	D. T. Davis	Jacob Marsh	Fitchburg, Mass.
W			
Wash. City, Va. Midland & Gr. Southern			Alexandria, Va.
Western Union	John Taylor	E. A. Eddy	Racine, Wis.
Wicomico & Pocomoke			Berlin, Md.
Wilmington, Columbia & Augusta	George Hall	W. J. Calais	Wilmington, N. C.
Westchester & Philadelphia	John Moyer	N. Pawling	Philadelphia. Pa.
Wilmington & Weldon	John Bissit	John Bissit	Wilmington, N. C.
Wilmington & Western			Wilmington, Del.
Wilmington & Reading	Jas. F. Van Horn		Coatesville, Pa.
West-Jersey	W. McAllister	C. C. Williams	Camden, N. J.
Western Maryland	Wm. Cannan	J. H. Nussear	Union Bridge, Md.
Winona & St. Peter	F. C. Ford	H. L. Preston	Winona, Minn.
Western North-Carolina	J. D Hollister		Salisbury, N. C.
Western R. R. N. C	M. W. Atkinson	M. W. Atkinson	Fayetteville, N. C.
West-Feliciana	R. C. Brower	Wm. Grawling	Woodville, Miss.
Western & Atlantic	John H. Flynn	Wm. Grambling	Atlanta, Ga.
West-Wisconsin	L. T. Mead	J. C. Fischer	Hudson, Wis.
Worcester & Nashua	Albert Griggs.	Albert Griggs	Worcester, Mass.
Welland	James Taylor	James Chase	St. Catharine, C. W.
Washington & Ohio	Edward Dunn	Joshua Harrison	Alexandria. Va.
White Water Valley	A. W. Britton		Harrison, Ohio

DIRECTORY

OF

Railway Superintendents and Purchasing Agents

THROUGHOUT THE UNITED STATES AND CANADA.

REFERENCES.—* General Manager. † Managing Director.

A

Railroad.	*Superintendent.*	*Purchasing Agent.*	*Residence.*
Arkansas Central	James E. Gregg		Helena, Ark.
Alabama Central	John M. Bridges		Montgomery, Ala.
Albany & Susquehanna	*C. F. Young		Albany, N. Y.
Alexandria & Fredericksburg	E. L. Dubarry		Washington, D. C.
Atchison, Topeka & Santa Fe	G. H. Nettleton	G. H. Nettleton	Topeka, Kansas.
Atchison & Nebraska	C. C. Smith	C. C. Smith	Atchison, Kansas.
Alabama & Chattanooga	Chas. L. Fitch	J. C. Stanton, Jr.	Chattanooga, Tenn.
Ashtabula, Youngstown & Pittsburg	D. B. McCoy		Pittsburg, Pa.
Atlanta & Richmond Air Line	R. Y. Sage		Atlanta, Ga.
Atlanta & West-Point	L. P. Grant		Atlanta, Ga.
Atlantic & Gulf	H. S. Haines		Savannah, Ga.
Atlantic & North-Carolina	E. G. Stanley		New-Berne, N. C.
Atlantic & Great Western	P. D. Cooper	R. B. Browne	Meadville, Pa.
First and Second Division	A. L. Dunbar		" "
Third and Fourth Division	T. A. Phillips		Galion, Ohio.
Mahoning Division	J. M. Ferris		Cleveland, Ohio.
Atlantic & Pacific	A. A. Talmage	W. H. Patriarche	St. Louis, Mo.
Atlantic, Mississippi & Ohio	Henry Fink		Lynchburg, Va.
Atlantic, Tennessee & Ohio	J. J. Gormly		Charlotte, N. C.
Allegheny Valley	J. J. Lawrence	J. J. Lawrence	Pittsburg, Pa.
Adirondack	C. H. Ballard		Saratoga, N. Y.

B

Baltimore & Ohio	Thos. L. Sharp	Benj. Williams	Baltimore, Md.
Central Ohio & Lake Erie Div.	W. C. Quincy		Columbus, Ohio.
Baltimore & Potomac	J. N. Dubarry		Baltimore Md.
Bangor & Piscataquis	M. H. Angel	L. H Eaton	Bangor, Maine.
Boston & Albany	C. O. Russell		Springfield, Mass
Boston & Providence	A. A. Folsom	A. A. Folsom	Boston, Mass.
Boston, Clinton & Fitchburg	*H. A. Blood		Fitchburg, Mass
Boston, Clinton & Fitchburg	S. A. Webber		Fitchburg, Mass.
Boston, Concord & Montreal	J. A Dodge	Lyon & Vose	Boston, Mass.
Boston & Maine	William Merritt	M. E Wood	Boston, Mass.
Boston, Lowell & Nashua	J. B. Winslow		Boston, Mass.
Blossburg, Corning & Tioga	A. H. Gorton	R. J. Burnham	Watkins, N. Y.
Brockville & Ottawa	H. Abbott		Brockville, Canada.
Burlington & Missouri River (in Neb.)	C. F. Morse	C. F. Morse	Plattsmouth, Neb.
Burlington, Cedar Rapids & Minnesota	William Greene	S. L. Dows	Cedar Rapids, Ia.
Burlington & South-Western	R. T. Hosford		Burlington, Iowa.
Buffalo & Jamestown	P. C. Doyle		Buffalo, N. Y.
Buffalo, New-York & Philadelphia	J. D. Yeomans		Buffalo, N. Y.
Buffalo, Corry & Pittsburg	H. H. Potter	N. M. Whitside	Corry, Pa.

C

Cairo & Fulton	Thos. Allen		St. Louis, Mo.
Cairo & Vincennes	L. W Palmer		Cairo, Ill.
Camden & Atlantic	E. Collings		Camden, N. J.
Canada Southern	*J. S. Casement		St. Thomas, Ont.
Carolina Central	S. L. Fremont		Wilmington, N. C.
Catasauqua & Fogelsville	C. W. Chapman	C. W. Chapman	Catasauqua, Pa.
Central Pacific	A. N. Towne	J. R. Watson	Sacramento, Cal.
Central of Georgia	Wm. Rogers	H. Yonge	Savannah, Ga.
Central of Iowa	D. N. Pickering		Marshalltown, Ia.
Central Raiload of New-Jersey	R. E. Ricker	W. S. Holden	Elizabeth, N. J.
Chesapeake & Ohio	A. H. Perry	J. A. Netherland	Richmond, Va.
Middle Division	H. D. Chapin		Staunton, Va.
Charlotte, Columbia & Augusta	James Anderson		Columbia, S. C.
Chicago & North-Western	Marvin Hughitt	R. W. Hamer	Chicago, Ill.
Wisconsin & Mill. Division	Arthur A. Hobert		Chicago, Ill.
Peninsula Division	S. C. Baldwin		Escanaba, Mich.
Madison Division	J. H. Stewart		Madison, Wis.
Kenosha Division	A. A. Hobart		Madison, Wis.
Galena Division	Edward J. Cuyler		Chicago, Ill.
Eastern Iowa Division	John B. Watkins		Clinton, Iowa.
Western Iowa Division	John A. Head		Boone, Iowa.
Chicago & Alton	J. C. McMullen	A. V. Hartwell	Chicago, Ill.
Chicago, Burlington & Quincy	R. Harris	H. J. Higgins	Chicago, Ill.
Eastern and Middle Division	C. H. Chappel		Aurora, Ill.
Galesburg Division	H. Hitchcock		Galesburg, Ill.
Quincy Division	N. D. Munson		Quincy, Ill.
Chicago, Dubuque & Minnesota	C. H. Hudson	F. T. Massey	Dubuque, Iowa.
Chicago & Iowa	C. B. Hinkley		Chicago, Ill.
Chicago & Pacific	R C. Tate		Chicago, Ill.
Chicago, Rock Island & Pacific	Hugh Riddle	A. Manvel	Chicago, Ill.
Illinois Division	Allen Manvel		Chicago, Ill.
Iowa Division	A. Kimball		Davenport, Iowa.
Chicago & Michigan Lake Shore	A. H. Morrison	Wm. R. Morrison	St. Joseph, Mich.
Chicago, Danville & Vincennes	L. Pearson	C. B. Mansfield	Chicago, Ill.
Chicago, Pekin & Southwestern	N. J. T. Dana		Streator, Ill.
Cincinnati, Wabash & Michigan	A. G. Wells		Wabash, Ind.
Cleveland, Columbus, Cincinnati & Ind.	E. S Flint		Cleveland, Ohio.
Indianapolis Division	C. C Gale		Indianapolis, Ind.
Columbus Division	Robert Blee		Cleveland, Ohio.
Cincinnati Division	R. H. Shoemaker		Cincinnati, Ohio.
Cleveland & Pittsburg	*J. N. McCullough		Pittsburg, Pa.
Cleveland, Mt. Vernon & Delaware	G. A. Jones		Akron, Ohio.
Cincinnati & Martinsville	T. C. Burnside		Franklin, Ind.
Cincinnati & Terre Haute	Matt. P. Wood	Matt. P. Wood	Terre Haute, Ind.
Cin., Cumberland Gap & Charleston	W. J Taylor		Knoxville, Tenn.
Cincinnati, Hamilton & Dayton	Lewis Williams	P. Hickey	Cincinnati, Ohio.
Cincinnati & Indianapolis Junction	M. M. Martin		Indianapolis, Ind.
Cincinnati, Lafayette & Chicago	E. H. Waldron	J. W. Haight	Lafayette, Ind.
Cincinnati, Sandusky & Cleveland	G. T. Benedict	J. C. Buxton	Sandusky, Ohio.
Colorado Central	T. E. Sickles		Golden, Col.
Columbus & Hocking Valley	J. W. Doherty	J. W. Doherty	Columbus, Ohio.
Concord & Claremont	George E. Todd		Concord, N. H.
Concord	H. E. Chamberlin	H. E. Chamberlin	Concord, N. H.
Connecticut River	John Mulligan	John Mulligan	Springfield, Mass.
Connecticut & Passumpsic Rivers	Wm. M. Parker		Lyndonville, Vt.
Connecticut Valley	Hiram Fowler		Hartford, Ct.
Connecticut Western	W. H. Yeomans		Hartford, Ct.
Corning & Tioga	L. H Shattuck		Blossburg, Pa.
Cumberland Valley	I. F. Boyd	I. F. Boyd	Chambersburg, Pa.

D

Danbury & Norwalk	John W. Bacon		Danbury, Ct.
Dakota Southern	J. S. Meckling	J. S. Meckling	Sioux City, Iowa.
Davenport & St. Paul	N. H. Wood		Urbana, Ill.
Dayton & Michigan	J. H. Weller		Dayton, Ohio.
Dayton & Union	C. C Gale		Indianapolis, Ind.
Delaware	H. F. Kenney		Philadelphia, Pa.
Delaware & Hudson	R. Manville		Carbondale, Pa.
Delaware, Lackawanna & Western	W. F. Halstead	G. W. B. Cushing	Scranton, Pa.
Morris & Essex Division	Andrew Reasmer	G. W. Bleashing	Hoboken, N. J.
Oswego and Syracuse Division	W. B. Phelps		Oswego, N. Y.
Utica, Chenango & Sus Division	George F. Thompson		Utica, N. Y.
Denver & Rio Grande	W. W. Borst	W. S. Jackson	Denver, Col.
Des Moines Valley	John Givin	G. E. Kilbourne	Keokuk, Iowa.
Detroit & Bay City	T. B. Sargent		Detroit, Mich.
Detroit and Milwaukee	Andrew Watson	John S. Lorimer	" "
Detroit, Hillsdale & Indiana	W. F. Parker		Ypsilanti, Mich.
Detroit, Eel River & Illinois	A. B. Southard		Denver, Ind.
Detroit, Lansing & Lake Michigan	A. H. Reese		Detroit, Mich
Dorchester & Delaware	D. Stewart Hessey		Cambridge, Md.
Dunkirk, Allegheny Valley & Pittsburg	D. Thayer	C. V. DeForest	New-York City.
Dubuque & South-Western	J. P. Farley		Dubuque, Iowa

E

East-Tennessee, Virginia & Georgia	Joseph Jaques		Knoxville, Tenn.
Eastern (Mass.)	J. Prescott	C. W. Pratt	Boston, Mass.
Elizabethtown & Paducah	D. Brock	D. Brock	Elizabethtown, Ky.
Erie	P. P. Wright	W. W. Tallman	New-York, N. Y.
Eastern Division	E. D. Hill		Port Jervis, N. Y.
Delaware Division	Benj. Thomas		Port Jervis, N. Y.
Susquehanna & Rochester Div.	C. W. Gardner		Elmira, N. Y.
Western & Buffalo "	R. G. Taylor		Buffalo, N. Y.
European & North-American	M. H. Angel	M. H. Angell	Bangor, Maine.
Erie & Pittsburg	John M. Kimball	Wm. Mullins	Erie, Pa.
Evansville & Crawfordsville			Evansville, Ind.
Evansville, Terre Haute & Chicago	Jos. Collett, Jr.		Terre Haute, Ind.

F

Fitchburg	Chas. L. Haywood	John Adams	Boston, Mass.
Flint & Pere Marquette	G. C. Kimball	G. C. Kimball	East-Saginaw, Mich.
Flushing & North-Side			Hunter's Point, L.I.
Fort Wayne, Jackson & Saginaw	W. A. Ernst	H. A. Ernst	Jackson, Mich.
Fort Wayne, Muncie & Cin	W. W. Worthington		Fort Wayne, Ind.

G

Galveston, Harrisburg & San Antonio	G. B. Nichols	J. W. Pierce	Galveston, Texas.
Galveston, Houston & Henderson	G. B. Nichols		Galveston, Texas.
Georgia	S. K. Johnson		Augusta, Ga.
Gilman, Clinton & Springfield	S. H. Melvin		Springfield, Ill.
Grand Rapids & Indiana	*C. E. Gorham		Fort Wayne, Ind.
S. Division	J. M. Matheany		Fort Wayne, Ind.
N. Division	H. D. Wallen, Jr		Grand Rapids, Mich
Grand Rapids & Indiana		William Mullins	Pittsburg, Pa.
Grand Trunk	C. J. Brydges	John Taylor	Montreal, Canada.
East Division	Henry Bailey		
West Division	W. J. Spicer		
Grand Tower and Carbondale	H. V. Olyphant	Wm. W. Harris	Grand Tower, Ill.
Great Western (Canada)	William K. Muir	Robert Beatty	Hamilton, Canada
Green Bay & Lake Pepin	D. N. Kelly		New-York City.
Greenville & Columbia	Thomas Dodamead		Columbia, S. C.

H

Hannibal & St. Joseph	O. S. Lyford		Hannibal, Mo.
Hartford, Providence & Fishkill	Samuel Nott		Hartford, Ct.
Housatonic	H. W. Franklin		Bridgeport, Ct.
Houston & Texas Central	J. Durand	W. M. Rice, N.Y.	Houston, Texas.
Southern Division	W. H. Vaughan		Houston, Texas.
Northern Division	M. G. Carey		Corsicana, Texas.
Huntingdon & Broad Top	J. McKillips	B. A. Knight	Huntingdon, Pa.

I

Illinois Central	A. Mitchell	O. Ott	Chicago, Ill.
Chicago Division	C. A. Beck		Centralia, Ill.
Northern Division	J. C. Jacobs		Amboy, Ill.
Iowa Division	D. W. Parker		Dubuque, Iowa.
Illinois & St. Louis	W. K. McComas		St Louis, Mo.
Indianapolis, Bloomington & Western	J. E. Gimperling		Urbana, Ill.
Indianapolis, Cincinnati & Lafayette	George L. Barringer		Cincinnati, Ohio.
Indianapolis & Vincennes	E. W. McKenna		Indianapolis, Ind.
Indianapolis & Vincennes		Wm. Mullins	Pittsburg, Pa.
Indianapolis & St. Louis	S. Woodward	J. W. Morse	St. Louis, Mo.
Indianapolis, Peru & Chicago	C. B. Robinson	D. Macy	Indianapolis, Ind.
Michigan City Division	E. C. Murphy		La Porte, Ind.
Intercolonial Railway	Lewis Carvell		Moncton, N. B.
International & Houston & Gt. Northern	H. M. Hoxie		Houston, Texas.
Iowa Midland	J. B. Watkins		Clinton, Iowa.

J

Jacksonville, North-Western & S. E.	E. S. Greenleaf		Jacksonville, Ill.
Jacksonville, Pensacola & Mobile	S. Conant		Jacksonville, Fla.
Jefferson, Madison & Indianapolis	Horace Scott	Wm. Mullins	Louisville, Ky.
Junction & Breakwater	John A. Sheaff		Lewis, Del.

K

Kansas Central	A. E. Buchanan		Leavenworth, Kan.
Kansas City, St. Joseph & Council Bluffs	J. F. Barnard		Detroit, Mich.
Kansas Pacific	Edward S. Bowen		Kansas City, Mo.
Kansas Pacific	J. L. Woods		St. Louis, Mo.
Kaw Valley Division	George Noble		Lawrence, Kansas.
Smoky Hill Division	O. H. Dorrance		Ellis, Kansas.
Denver Division	C. W. Fisher		Denver, Col.
Kentucky Central	G. H. Pendleton	Geo. P. Bowler	Covington, Ky.
Knox & Lincoln	C. A. Combs	Oliver Morse	Bath, Maine.

L

Lackawanna & Bloomsburg	D. T. Bound	G. W. B. Cushing	Kingston, Pa.
Lake Erie & Louisville	I. H. Burgoon		Fremont, Ohio.
Lake Ontario Shore	E. A. Van Horne		Oswego, N Y.
Lake Shore & Tuscarawas Valley	W. W. Card		Cleveland, Ohio.
Lake Shore & Michigan Southern	Charles Paine	A. C. Armstrong	Cleveland, Ohio.
Kalamazoo Division	William Wheaton		Kalamazoo, Mich.
Detroit Division			
Lansing Division			
Leavenworth, Lawrence & Galveston	Chas. B. Peck	E. O. Foote, Jr.	Lawrence, Kan.
Lawrence & South-Western	R. B. Gemmell	R. B. Gemmell	Lawrence, Kan.
Lehigh Valley	Robert H. Sayre		Bethlehem, Pa.
	L. Chamberlin		Philadelphia, Pa.
Beaver Meadow Division	A. G. Brodhead, Jr.		Mauch Chunk, Pa
Mahoy Division	James I. Blakslee		Mauch Chunk, Pa.
Wyoming Division	A. Mitchell		Wilkesbarre, Pa.
Little Rock & Fort Smith	S. B. Beaumont		Little Rock, Ark.
Logansport, Crawfordsville & S. W.			Cincinnati, Ohio.
Long Island	Jno. B. Morford	Oliver Charlick	Hunter's Point, L I.
Louisville & Nashville & G. Southern	Albert Fink	G. C. Breed	Louisville, Ky.
Clarksville Division	Robert Meek		Clarksville, Tenn.
Memphis Division	J. T. Flynn		Memphis, Tenn.
Nashville & Decatur Division	D. F. Whitcomb		Nashville, Tenn.
So. & North Ala. Division	M. Stanton		Birmingham, Ala.
Louisville, Cin. & Lexington	George Skinner	Geo. Skinner	Louisville, Ky.
Louisville, New-Albany & Chicago	M. Sloat	J. R. Parker	New-Albany, Ind.

M

Macon & Brunswick	William McRae	Solomon Hass	Macon, Ga.
Maine Central	L. L Lincoln	G. A. Phillips	Augusta, Me.
Androscoggin Division	A. Brown		Lewiston, Me.
Manchester & Lawrence	H. E. Chamberlin		Concord, N. H.
Marietta & Cincinnati	W. W. Peabody		Cincinnati, Ohio.
Marietta & Pittsburg	A. J. Warner	R. B. Hoover	Marietta, Ohio.
Marquette, Houghton & Ontonagon	*Samuel Schoch	C. E. Van Cleve	Marquette, Mich.
Maryland & Delaware	J. L. Caldwell	J. L. Caldwell	Easton, Md.
Memphis, Carthage & North-Western	George A. Burt		Carthage, Mo.
Memphis & Little Rock	A. S. Livermore		Memphis, Tenn.
Memphis & Charleston	W. J. Ross	J. B. Galloway	Memphis, Tenn.
Michigan Central	H. E. Sargent		Chicago, Ill.

Railroad.	*Superintendent.*	*Purchasing Agent.*	*Residence.*
Michigan Central		John Newell	Detroit, Mich.
Grand River Valley Division			Grand Rapids, Mich.
Jackson, Lansing & Saginaw Div.	Geo. C. Hopper		Saginaw City, Mich.
South-Haven Division	Geo. E. Curtiss		Kalamazoo, Mich.
Joliet Division	Carlton Wheeler		Joliet, Mich.
South-Bend Division			
Michigan Lake Shore	Chas. E. Gorham		Fort Wayne, Ind.
Michigan Lake Shore	P. S. O'Rourke		Monteith, Mich.
Midland Railway of Canada	H. G. Taylor		Port Hope, Ont.
Midland Pacific	J. N. Converse		Lincoln, Neb.
Milwaukee & Northern	J. W. Crippin		Milwaukee, Wis.
Milwaukee, Lake Shore & Western	W. Elwell		Sheboygan, Wis.
Western Division	J. S. Buck		Appleton, Wis.
Milwaukee & St. Paul	*S. S. Merrill	Rob't Wason	Milwaukee, Wis.
Mineral Point	G. W. Cobb		Mineral Point, Wis.
Mississippi Central	R. N. Colquhoun		Water Valley, Miss.
Mississippi Central		A. S. Roberts	New-Orleans, La.
Mississippi & Tennessee	M. Burke	M. Burk	Memphis, Tenn.
Mississippi Valley & Western	E. P. Buell		Quincy, Ill.
Missouri, Iowa & Nebraska	Col. Henry Hill		Warsaw, Ill.
Missouri, Kansas & Texas	W. R. Woodward	G. M. Babcock	Sedalia, Mo.
Cherokee Division	W. H. Adams		Chetopa, Kansas.
Choctaw Division	S. G. Eddy		Holden, Mo.
Eastern Division	Mark M. Towne		Hannibal, Mo.
Sedalia Division	J. J. Frey		Sedalia, Mo.
Neosho Division	L. S. Hamilton		Neosho Falls, Kan.
Missouri Pacific	A. A. Talmage	W. H. Patriarche	St. Louis, Mo.
Missouri River, Fort Scott & Gulf	B. S. Henning	Allen Bowen	Kansas City, Mo.
Mobile & Ohio	L. J. Fleming	C. E. Rushing	Mobile, Ala.
	Cecil Fleming		Mobile, Ala.
	E. S. Hosford		Macon, Miss.
	M. M. Miller		Jackson, Tenn
Mobile & Girard	W. L. Clark		Columbus, Ga.
Mobile & Montgomery	G. Jordon	G. Jordon	Montgomery, Ala.
Montgomery & Eufaula	B. Dunham	B. Dunham	Montgomery, Ala.
Morgan's Louisiana & Texas		C. A. Whitney & Co.	New-Orleans, La.
N			
Nashville, Chattanooga & St. Louis	J. W. Thomas		Nashville, Tenn.
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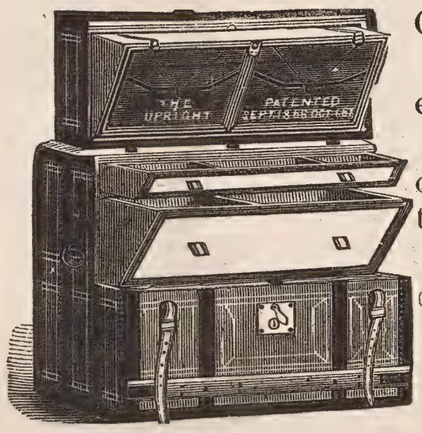

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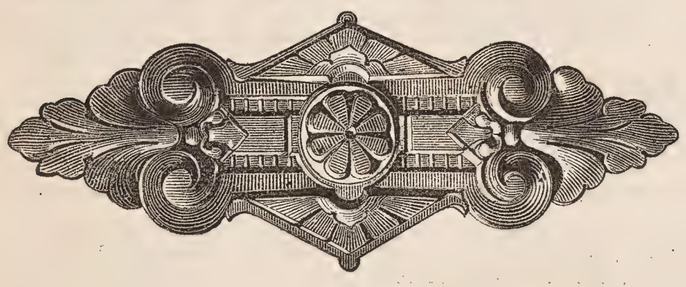

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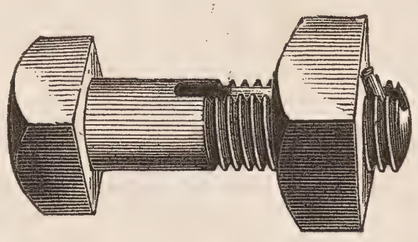
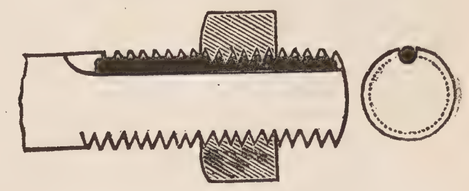


"CUMMING NUT-LOCK,"
Patented
June 16, 1868,
August 23, 1870.



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This is the only method in use that locks the nut firmly to the bolt without regard to place or surroundings, all others require some attachment that holds the bolt in its position, and a washer or other attachment to keep the nut from turning.

DIRECTIONS FOR USE.—Place the copper key in the slot, pointed end out, and beveled side up, in such a position that when the nut is screwed to its place about three-eighths of an inch of the key will project beyond its outer face. Then screw the nut to its place *over the key*, allowing it to cut its own thread in the copper. Then take a narrow flat set punch, and rivet the projecting part of the key *solidly* against the outer face of the nut. To tighten the nut: screw it up, and rivet the key tighter. To remove the nut: simply apply the wrench and unscrew the nut. It will cut its own way out through the copper. The same key can be used several times, by moving it outward a few threads in the slot.

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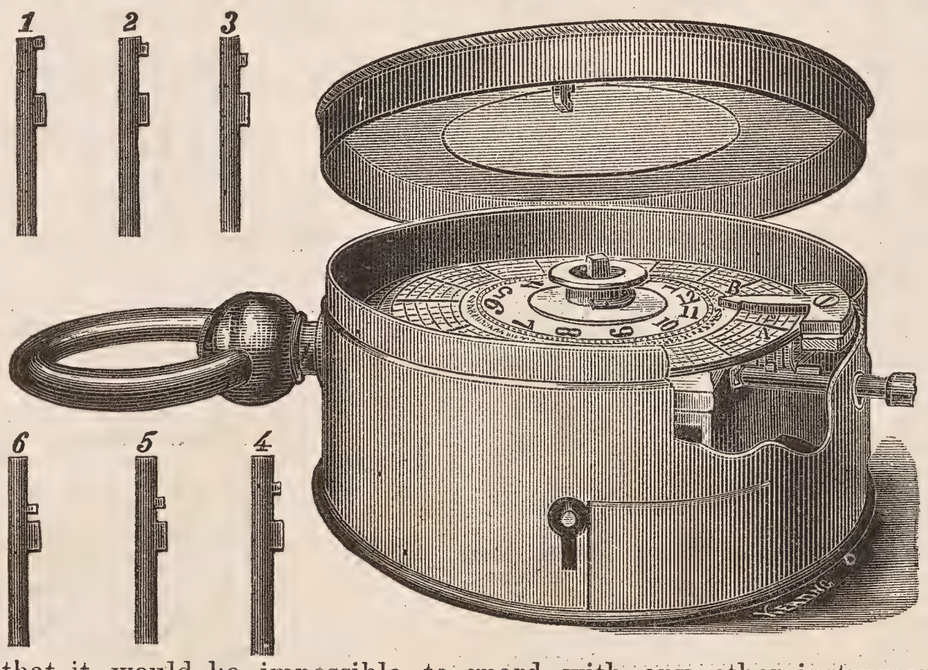

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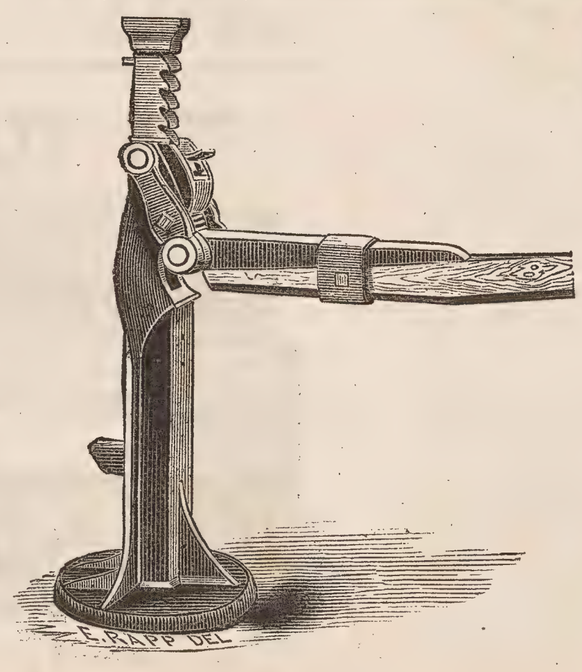

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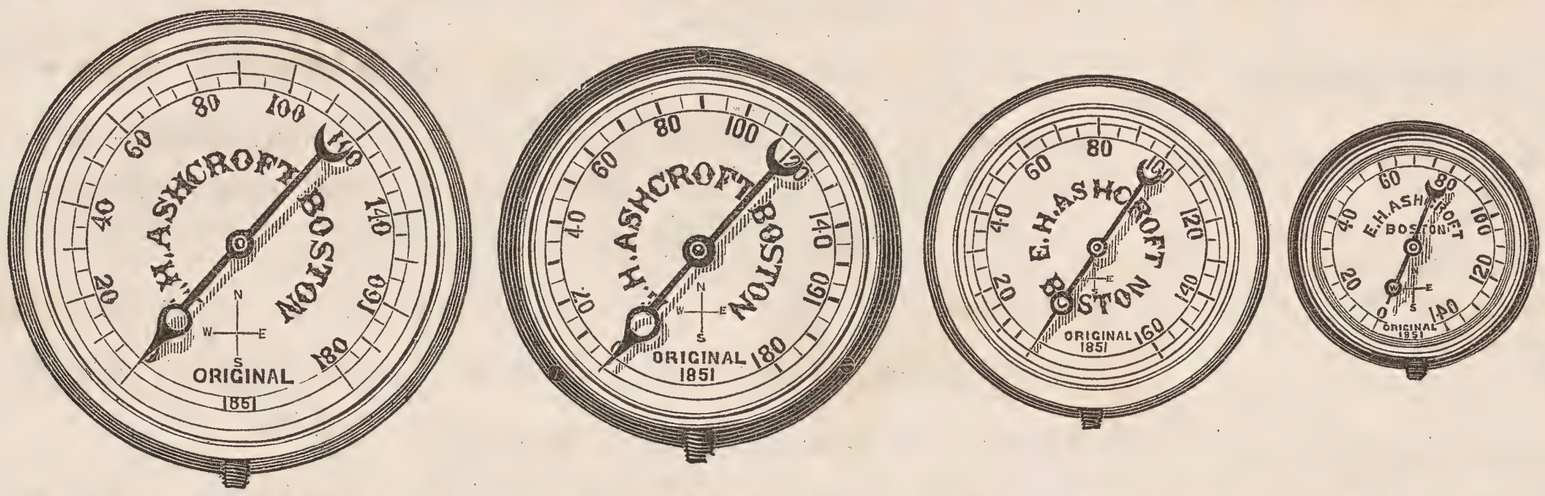

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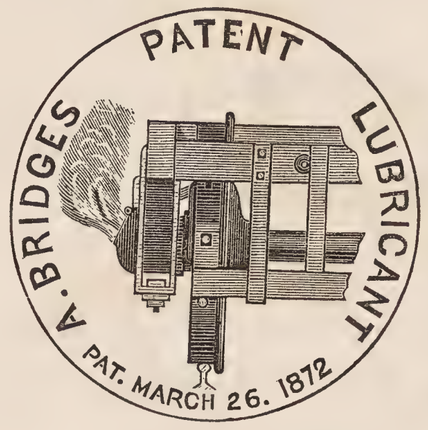

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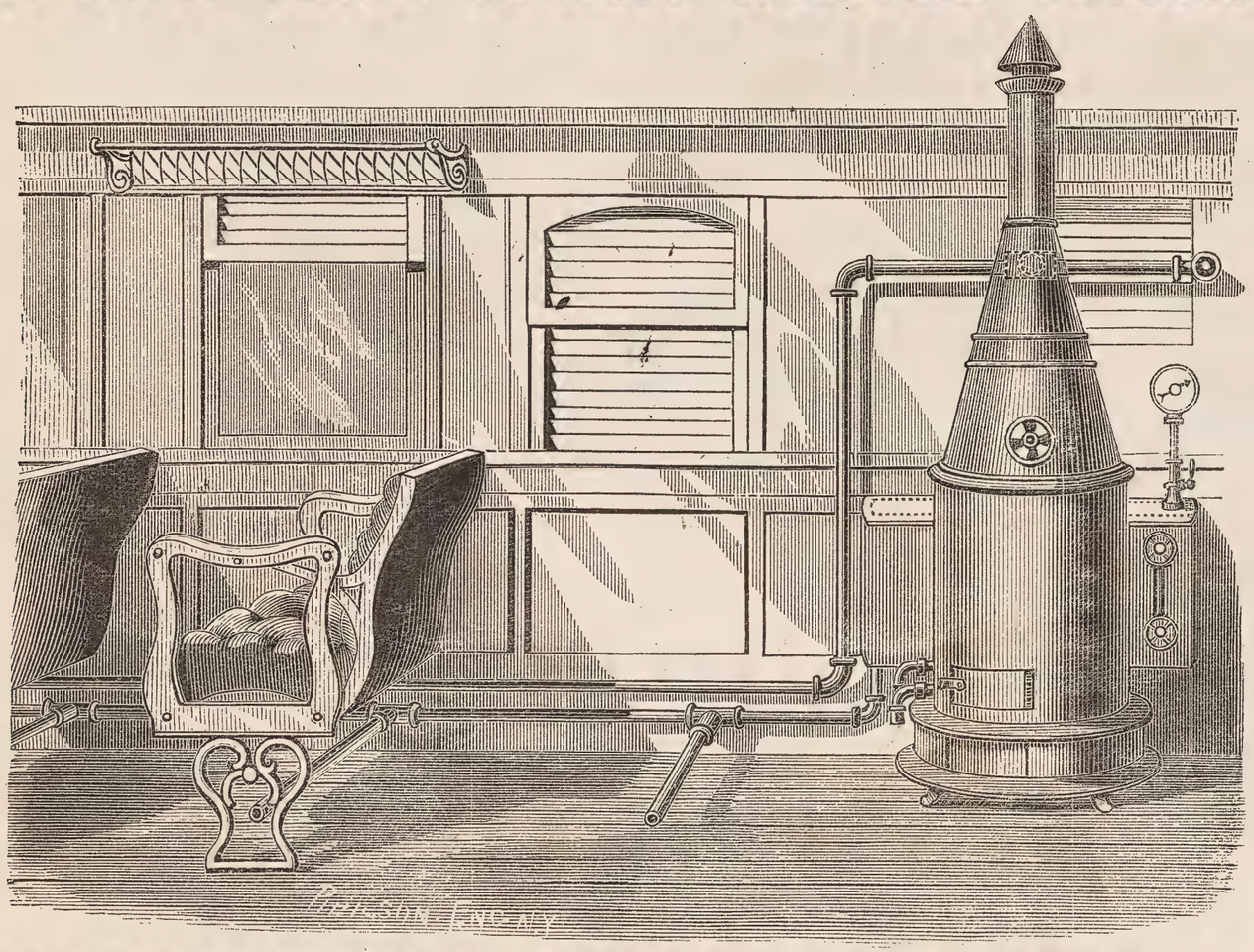

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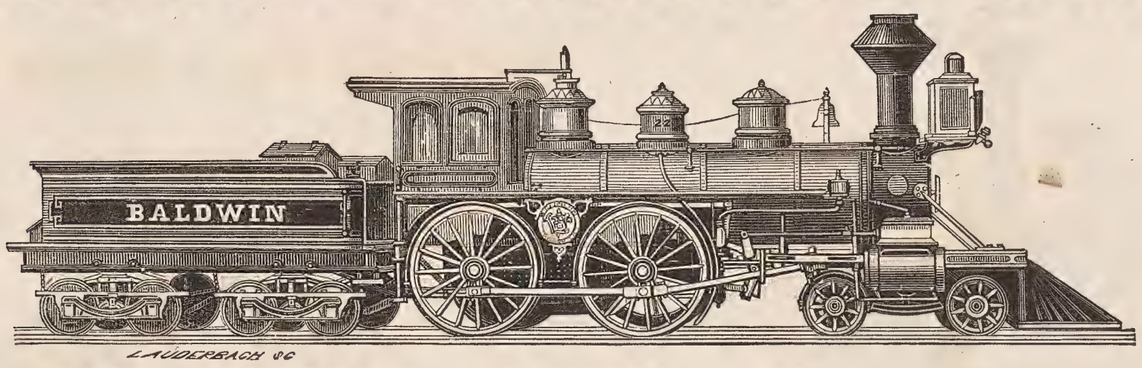

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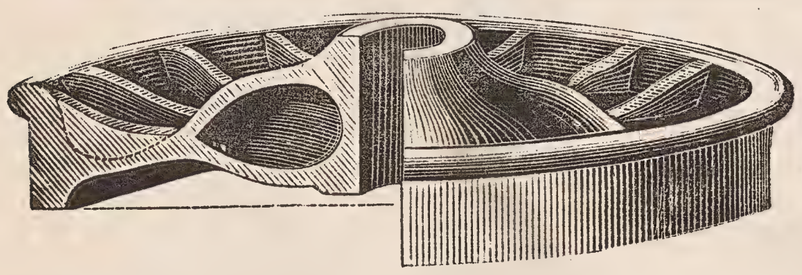

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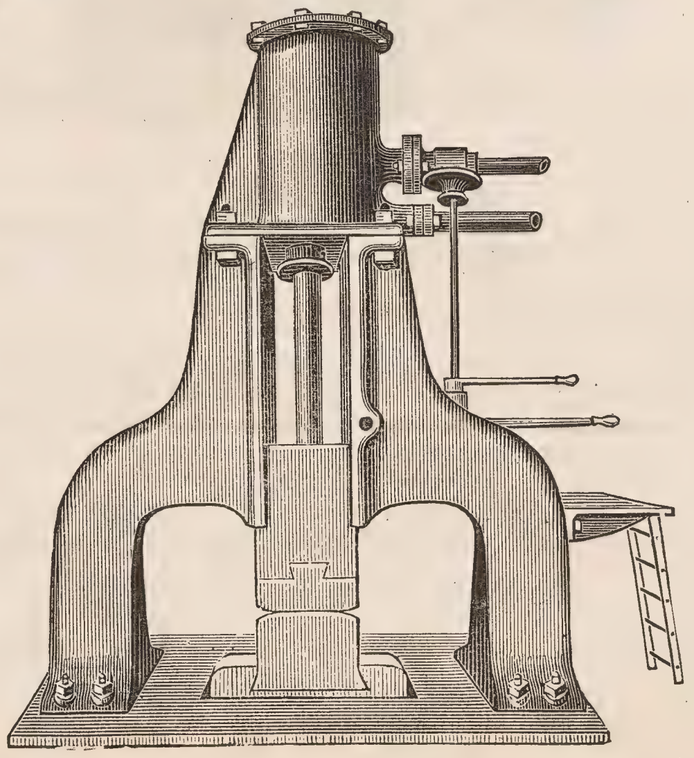

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Having full confidence in the men whose signatures are attached hereto, I endorse all they say, and confidently recommend Mr. TULLY'S PATENT PAINT FILLER to all in want of an article of the kind.

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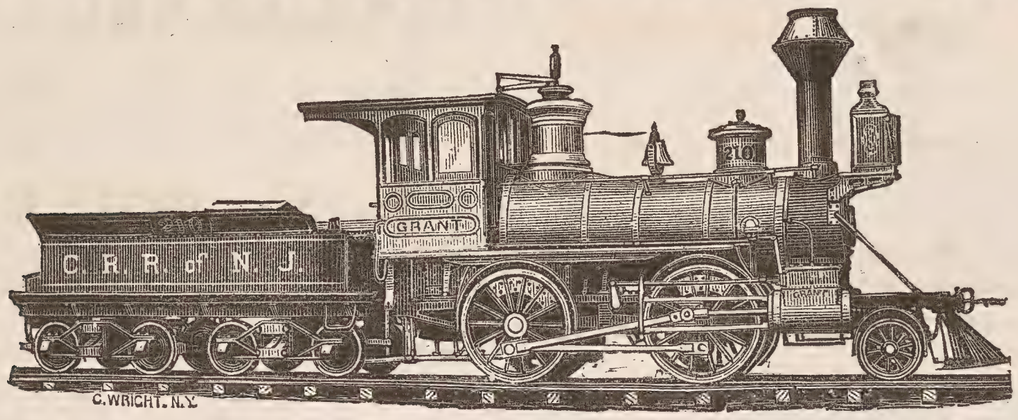

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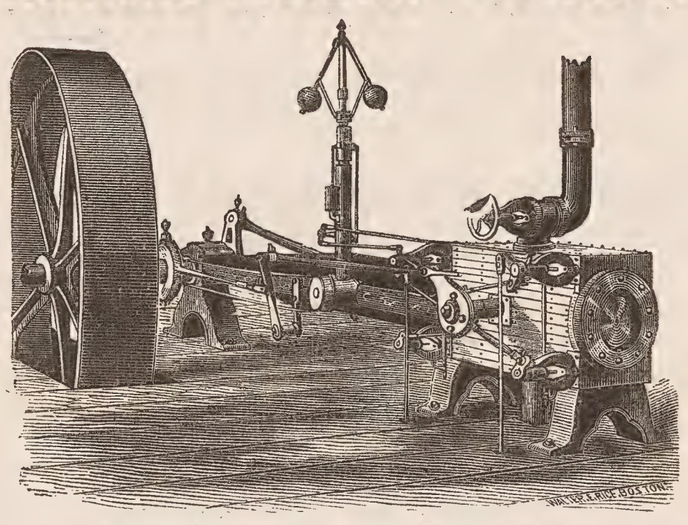

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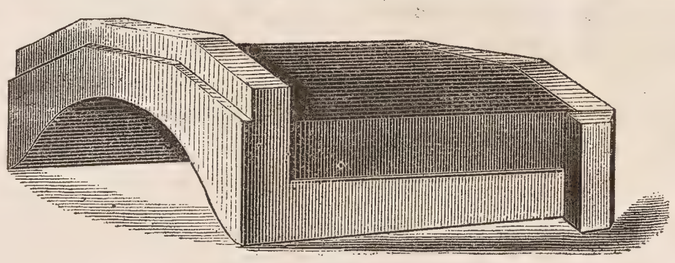

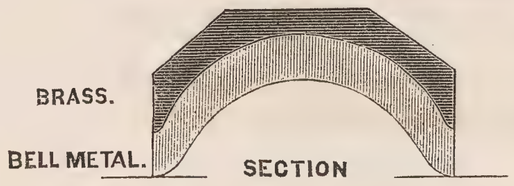

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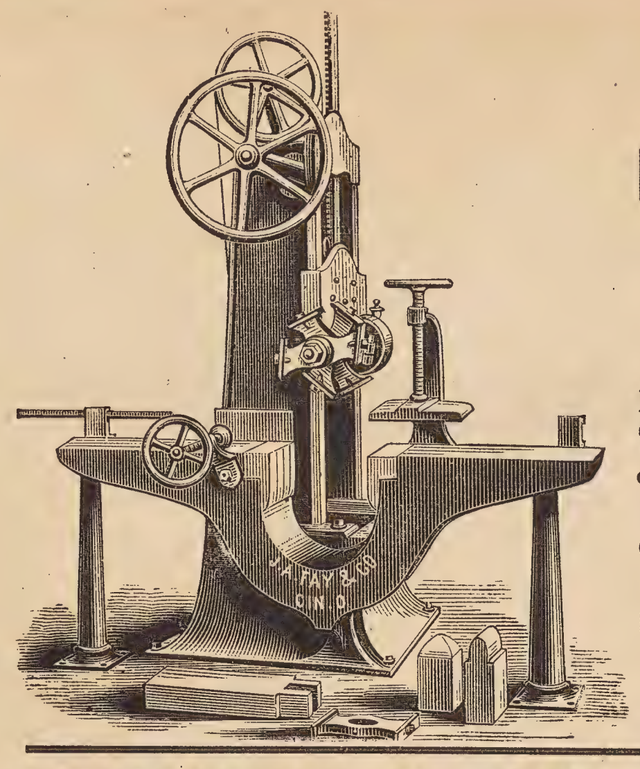

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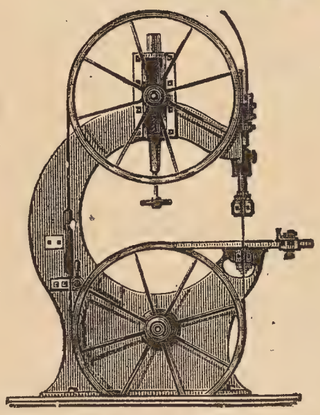

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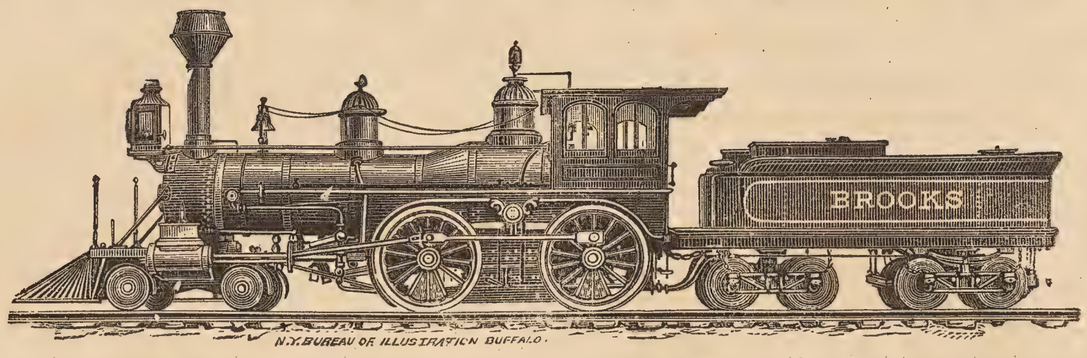

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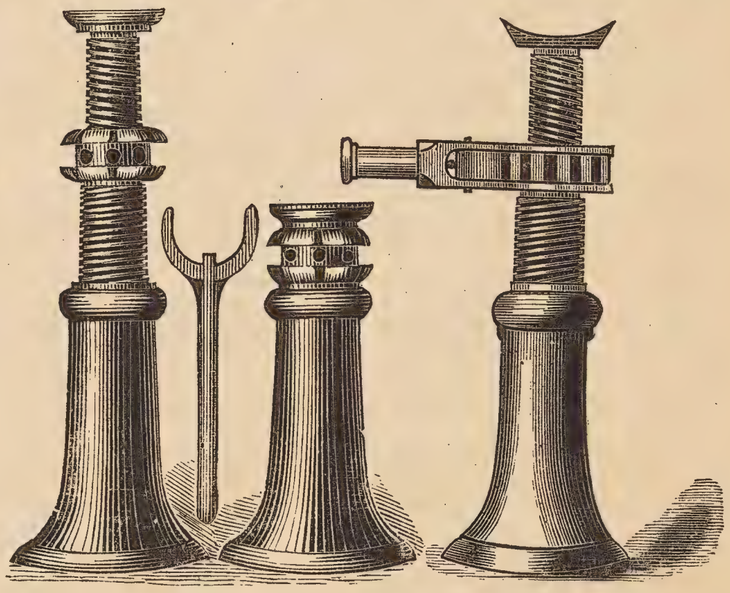

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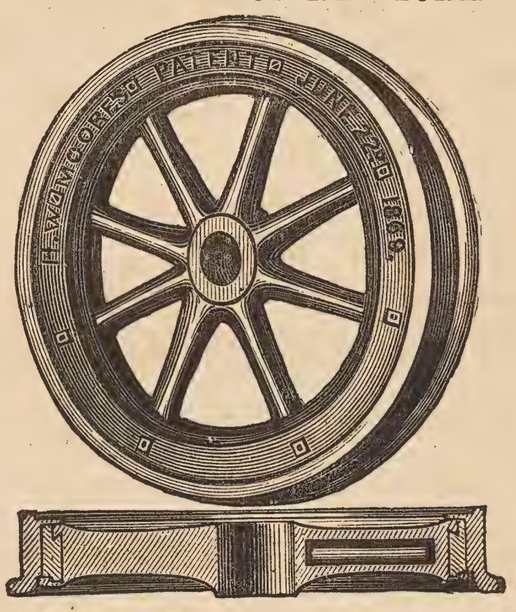

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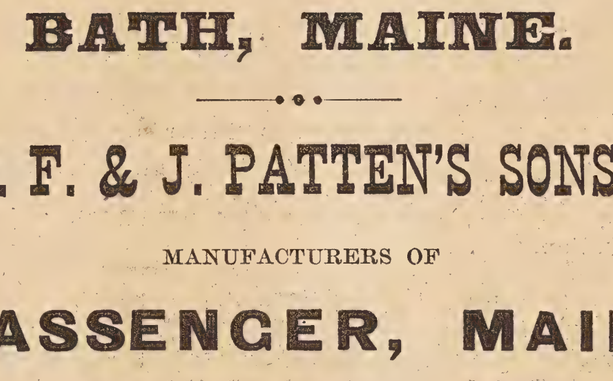

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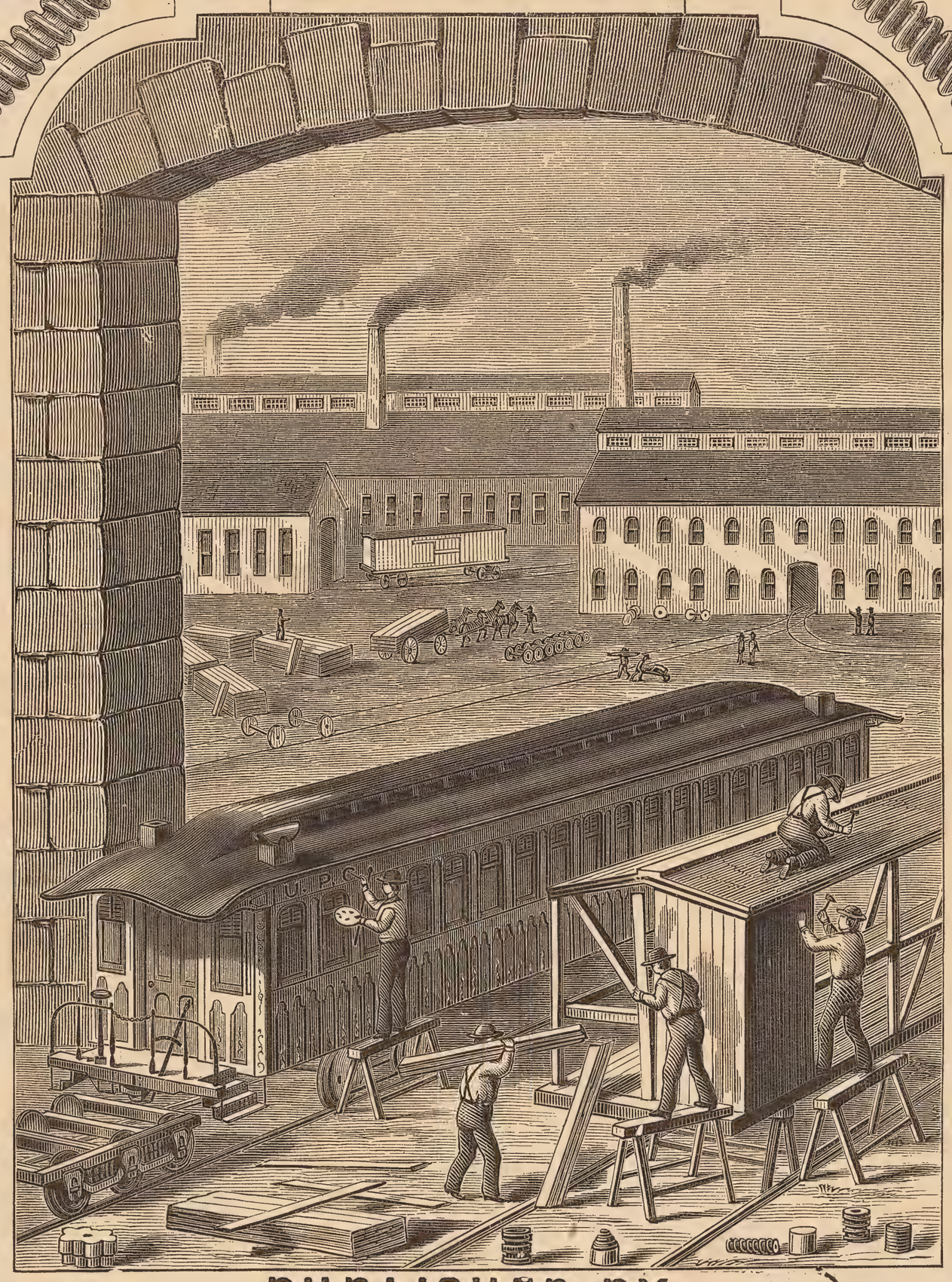
Vol. IV. DECEMBER 1873. No. 12.



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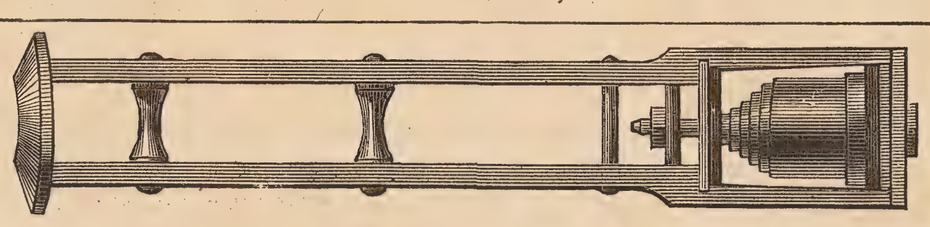

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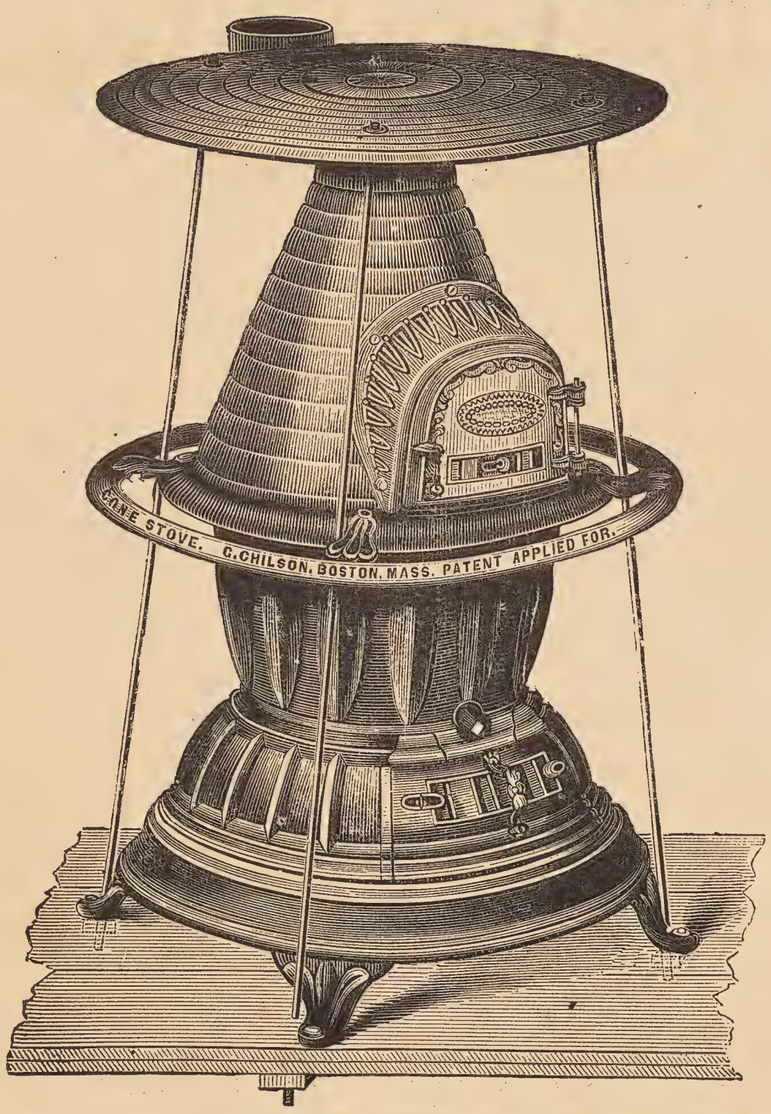
A NEW RAILWAY CAR STOVE.

Chilson's Patent Cone Disk Stove

ON A NEW AND MODEL PLAN.



I WOULD respectfully call the attention of Railway Managers and others interested in warming Railway Cars, Station Houses, etc., to this Stove, which has been thoroughly tested on several of our railways for a few years past, and has proved in every instance the most successful plan yet devised for thoroughly warming Railway Cars. This Stove is on a new and model plan, differing in principle and operation from all others in the United States. I claim for it *Safety*, *Economy*, *Durability*, *Simplicity*, *Cleanliness, and Beauty of Design*. Its peculiar merits may be stated as follows:

1. The conical radiator holds the hot smoke and gases back near the fire until they are thoroughly consumed, and the heat is rapidly radiated from the tapering surface of the cone.

2. The broad radiating disk prevents the heat from ascending to the upper part of the car or room, but distributes and throws it down to the floor, thoroughly warming the lower currents of cold air in the car or room for a great distance around the Stove, thus securing the long desired object of making the *lower part of the car and floor comfortably warm, especially for the feet.*

3. It is constructed in the most substantial and durable manner, from a new and beautiful design, wholly of *cast iron*, hence is not subject to the repairs of common stoves.

4. It is perfectly *safe*, being well secured against *accidental fires by being bolted down to the floor and having locks on the doors, so that in case a car should be overturned, fire could not get out of the Stove.* The guard rail which supports the feet when warming them, also serves as a fender, preventing the clothing from coming in contact with the Stove.

5. There is no hearth for dirt, filth, and tobacco spittle to accumulate on, which insures *cleanliness around the Stove.*

6. This Stove keeps the fire for a long time, and although adapted for coal, yet wood can be burned in it equally well.

It will be highly appreciated by all in want of a superior heater for *Factories, Stores, Offices*, RAILROAD CARS, and STATION HOUSES, *School Rooms, Workshops, etc.*, and has especially proved itself to be the most successful plan yet devised for warming RAILROAD CARS.

The BOSTON AND PROVIDENCE RAILROAD COMPANY have over two hundred of these Stoves in use, and the BOSTON AND ALBANY and several other Roads are adopting them, with the most perfect success.

BOSTON AND PROVIDENCE RAILROAD CORPORATION,
Superintendent's Office, Boston, April, 1873.

GARDNER CHILSON, Esq.: *Dear Sir:* We have about two hundred of your new "Cone" Disk Stoves in use, (a part of them for nearly five years,) for warming Passenger Cars and Stations. I can truly say that they have given entire satisfaction. These Stoves possess many important advantages over any other we have ever used, viz.: for warming the floor and displacing the cold air in the lower part of the car, whereby they are rendered much more comfortable, especially for the feet, than by any other plan known to us. The Stove is more economical in the consumption of fuel, more substantial in construction, and consequently requiring less repairs than any other in use, and so securely constructed as to prevent fire from getting out of the stove even should the car be *overturned*. I cheerfully give my testimony in favor of this Stove, and commend it to all Railroad Managers.

Yours, etc.,
A. A. FOLSOM, *Superintendent.*

Numerous other testimonials received from Railroads and other persons having these Stoves in use in Halls, Stores, etc., may be seen at office. Bolts are not required except for Cars and Steamboats.

Chilson's Improved Celebrated Cone Furnaces, for setting in Brickwork or in Portable Casings, Chilson's Unrivaled Double-Oven Brick Cooking-Range; Chilson's New and Splendid Arlington Portable Range; Chilson's very Superior Arlington Cooking Stove; Parlor, Office, and Store Stoves, Parlor Grates, Registers, Ventilators, etc.

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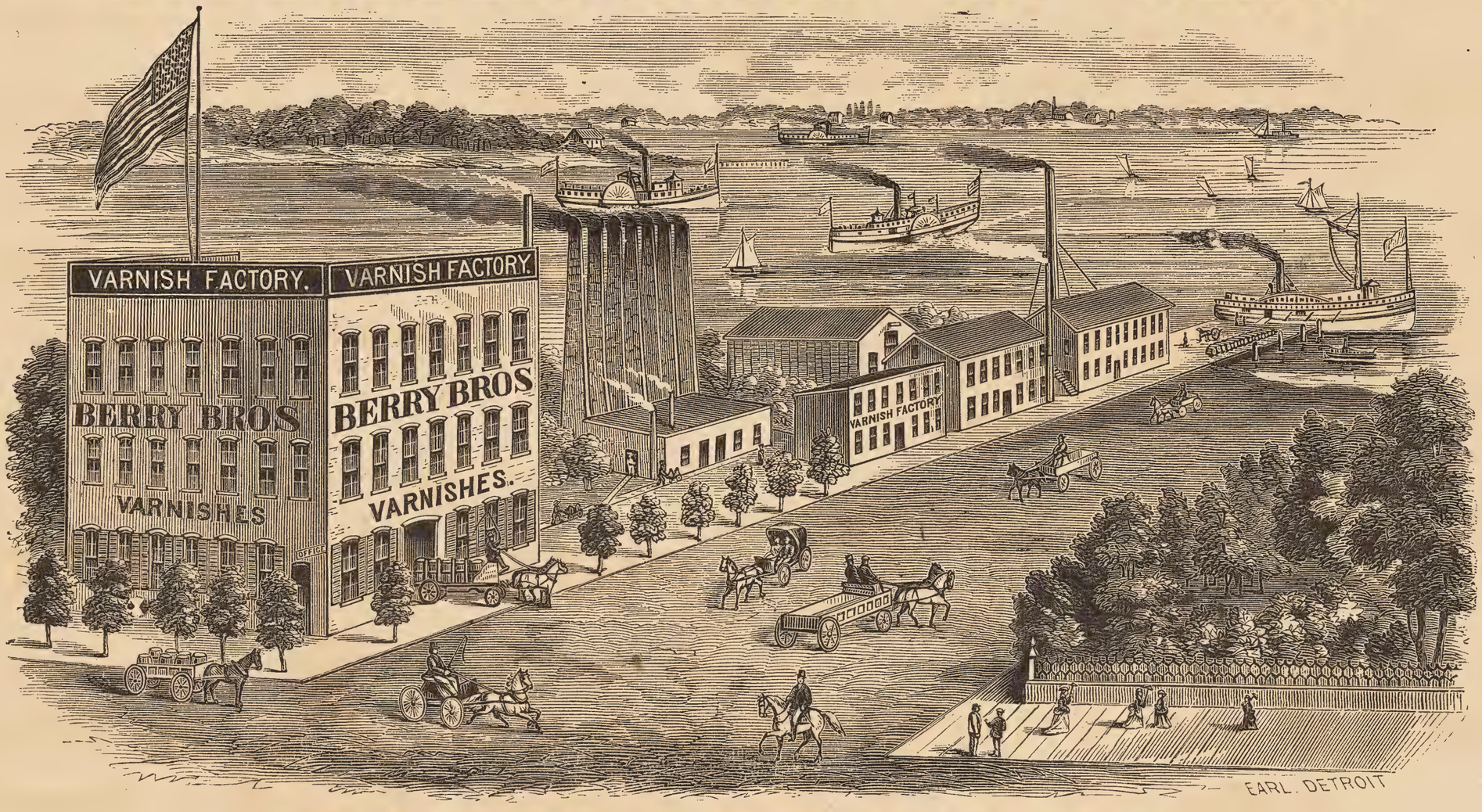

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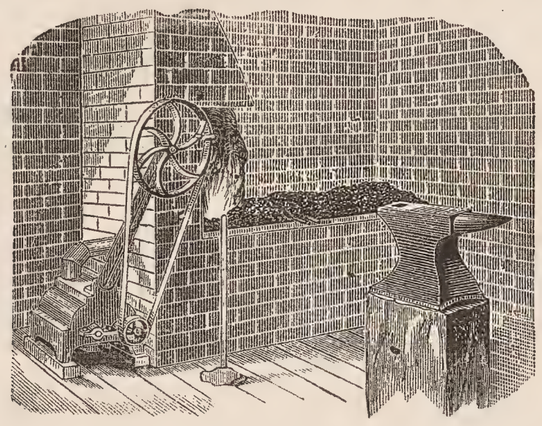

For Carriage Makers, Blacksmiths, and General Forging,

Can be operated by hand or power, and now used by many Railroads throughout the country, of which we name a few—namely, Camden and Amboy Railroad, Central Railroad of New-Jersey; Long Island Railroad; Staten Island Railroad; Belvidere Delaware Railroad; Vermont Central Railroad; Catasauqua and Fogelsville Railroad.

The advantages of this Blower over the old leather bellows, are:

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Being made of Iron, it will outlast many pairs of leather Bellows.

GREATER ADAPTABILITY.

It gives a Force Blast that can be raised instantly from the slightest breath to the strongest blast.

GREATER DISPATCH OF WORK.

It heats much more rapidly than the Bellows, and is every instant under absolute control.

GREATER ECONOMY.

By producing a more perfect combustion, it saves a large amount of fuel, besides it occupies but a very limited space, and it ventilates the shop much better than bellows, as it takes the air from near the floor, the natural stratum of foul air.

Thus it saves *coal*, *time*, *space*, and preserves the *health*. No. 1 Blacksmith Hand-Blower will furnish ample blast for one large fire by hand or two by power.

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Patent Improved Portable Forge,

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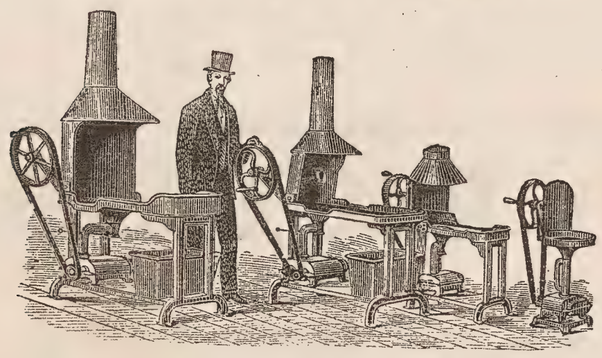

Can be operated either by hand or power, and now used by many Railroads—namely, Indianapolis and St. Louis Railroad; Lehigh Valley Railroad; Central Railroad of New-Jersey; Pittsburgh and Connellsville Railroad; Camden and Amboy Railroad and Ferry Co.; Boston, Hartford, and Erie Railroad; Raleigh and Gaston Railroad, and many others.

The Forge is compact, durable, reliable, convenient, easily moved, and yet has great heating capacity, as the blast is furnished by our Blower, making it in fact the best Portable Forge in existence.

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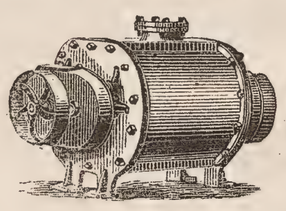
PATENT FORCE-BLAST ROTARY BLOWERS

OF ALL  SIZES,

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Patent Coupling,

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Second. The expense is but a trifle more than the ordinary coupling, and will be saved in pins alone in a very short time.

Third. The saving of time is also a great consideration, as the engineer alone can couple a train of cars in much less time than with the aid of two or three men with the ordinary coupling.

Fourth. There is no going between the cars to shackle or unshackle; *it is entirely safe, always ready, always sure.* To companies desirous of testing the coupling, one or more castings will be furnished gratuitously, for trial.

The Boston and Albany Railroad Co., after a thorough trial, being satisfied of its utility, have purchased the right for their road, and we are permitted to refer to the officers and employés of the road, who have given attention to it.

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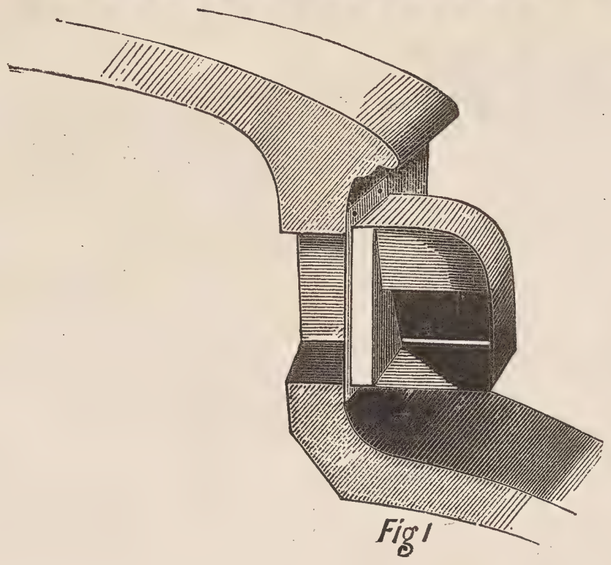

Fig 1

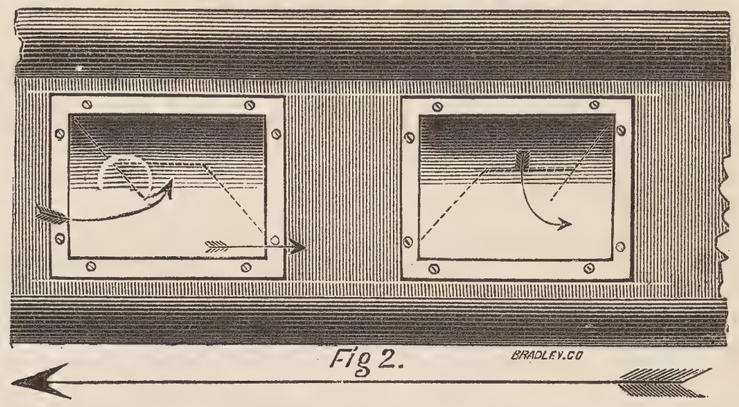

Fig 2. BRADLEY.CO

THE Ventilators are placed as usual in the car roof as shown in Fig. 1, their mouths facing alternately in opposite directions, those facing forward admitting the air, and those facing backward affording an exit. Fig. 2 represents a side section of the raised roof with two of the ventilators alternately arranged. When the car is moving in the direction indicated by the arrow, it will be seen, by the curved darts, that there is an ingress and egress of air constantly taking place. The operation of the ventilators is reversed with precisely the same effect, when the car moves in the opposite direction. The internal structure is such that the dust and cinders passing into the mouth of the ventilator are intercepted by striking against two shields, shown in Fig. 1, and indicated by dotted lines in Fig. 2, and are thus naturally thrown to the bottom, where they are carried out through a small opening as shown in Fig. 1, and by the straight dart in Fig. 2, a current of pure air being forced into the car at the same time through a lateral opening. The faster the car moves, the greater is the quantity of air admitted and expelled, thus securing a free circulation which does not subject the occupants to a direct current or draught. The ventilator is also noiseless in its operation. There is no clattering of valves, and no change is necessary when the car reaches its destination. Once put in place, it is always in readiness, and runs itself independent of all employees.

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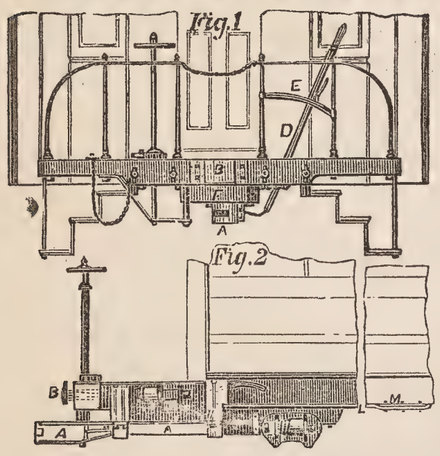
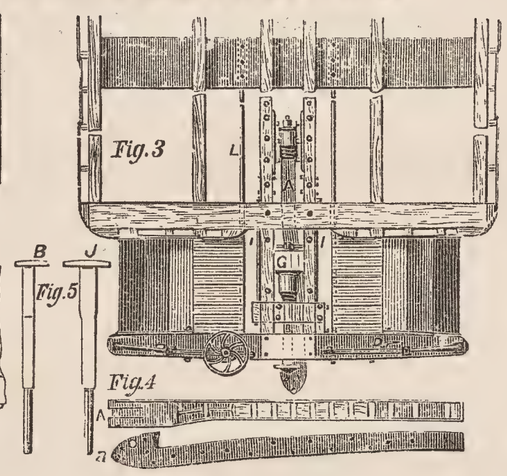
Proprietors and Manufacturers.

ROBERT HITCHCOCK, Inventor.

MILLER'S TRUSSED PLATFORMS. Compresssion Buffers and Automatic Couplers for Railroad Passenger Cars.





Office, 231 Broadway, (Rooms 4 and 5,) New-York.

Send for Illustrated Pamphlet, and call and see working models. **E. MILLER, Patentee.**

DESCRIPTION.

Figure 1 is an elevation; Figure 2, a longitudinal section; Figure 3, a plan of an end of a car to which the arrangement has been applied; and Figures 4 and 5 show top and side views of the "Hook" and "Buffer," drawn on a larger scale than that of Figures 1, 2, and 3.

The letters refer to the same parts in all the figures. A is the coupling "Hook," B the "Buffer," C the "Stop," D the "Lever," E the "Quadrant Ratchet," F the "Truss Beam," G the "Spring Beam," H the "Suspender Beam," I the "Upward Trusses," K the "Main Spring," L the "Downward Trusses," and M the "Bolster."

The Platforms, instead of being located below the centre line of the main sills of the cars, are placed *in* that line and held there by the Trusses I and L, so that the point of contact (in Buffers B) is *in* the said centre line and *not below* it.

The coupling "Hook" A is attached to the draw spring the same as the ordinary draw head, and at the same height above the track, but in such a manner that the outer end is free to move laterally for a short distance. The Coupling Hook projects beyond the platform. The Stop C is placed under the Buffer Beam to prevent accidental uncoupling. When two cars are brought together, the Coupling Hooks, from *their shape*, push each other aside, until the Buffers B are compressed hard on the Buffer Springs, then—*the points of the hooks having passed each other sufficiently far*—the Hooks are carried forward by their main-springs, and thus the "*Coupling*" and "*Compression*" are both effected automatically *and at the same time*, and without the use of links and pins. When two cars are thus coupled together, the *head* of the *Hook* of each car is under the Buffer Beam of its opposite car, and the platforms are close together, (about 4 inches apart.) The effect of this is, *one platform can not be forced over the other*, nor can a *child* fall between the platforms; the dust and rain are nearly all shut out; the "Compression" makes the train run steadily, and prevents all jerking at starting and stopping.

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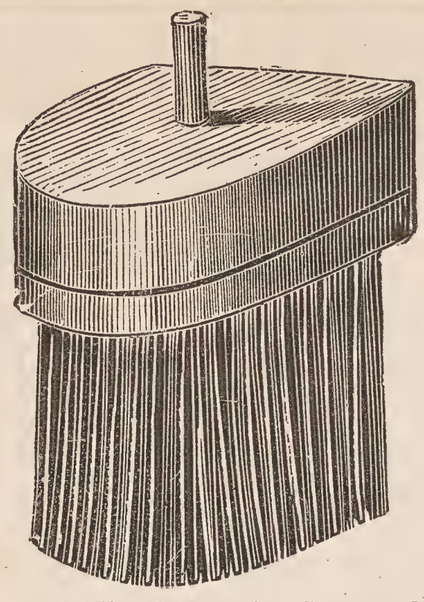

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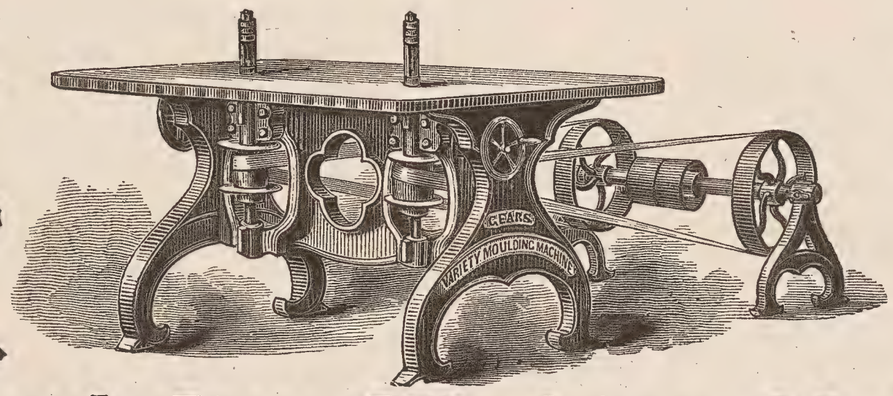

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ESTABLISHED 1849.

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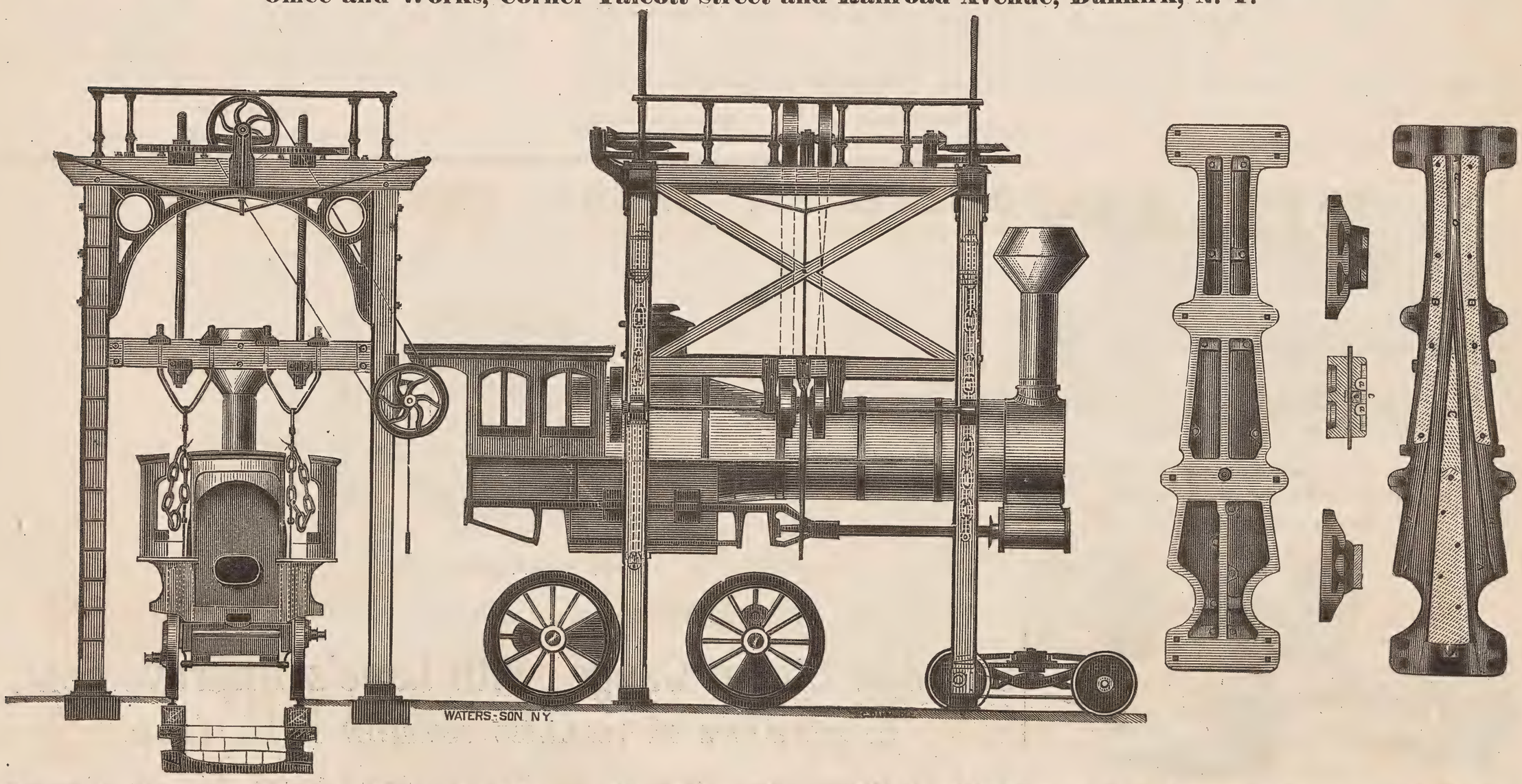
Office and Works, Corner Talcott Street and Railroad Avenue, Dunkirk, N. Y.



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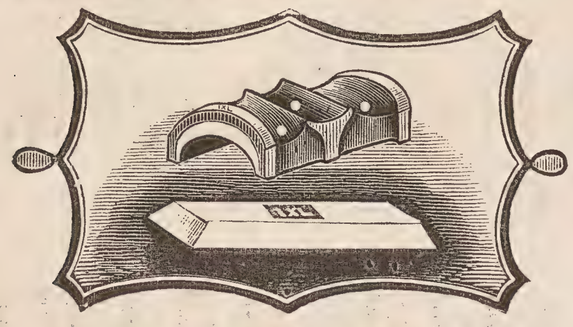

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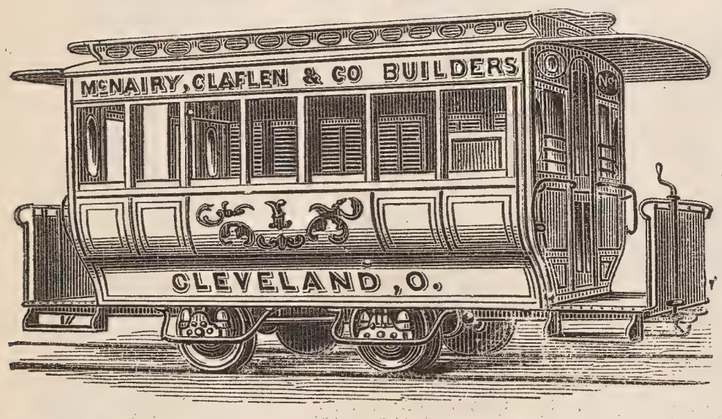

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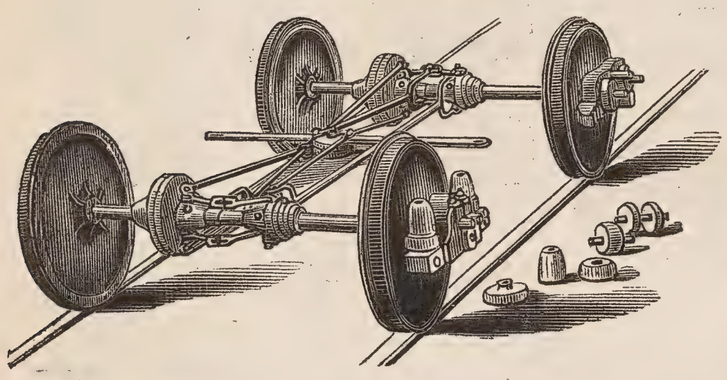

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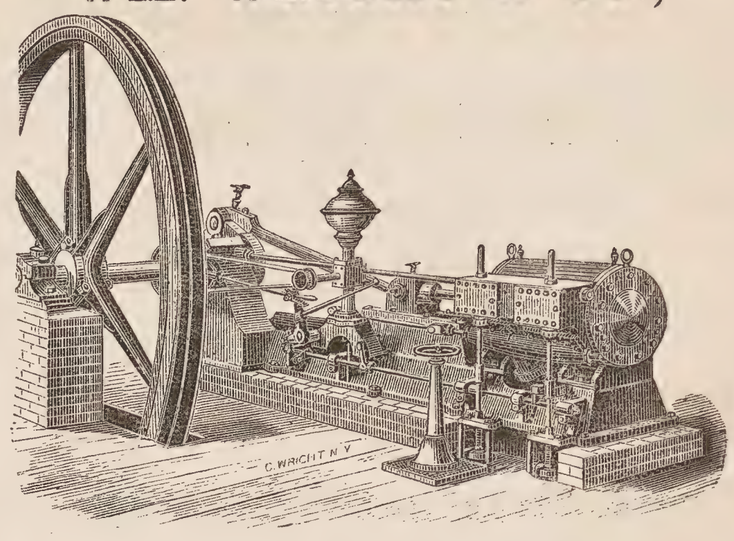

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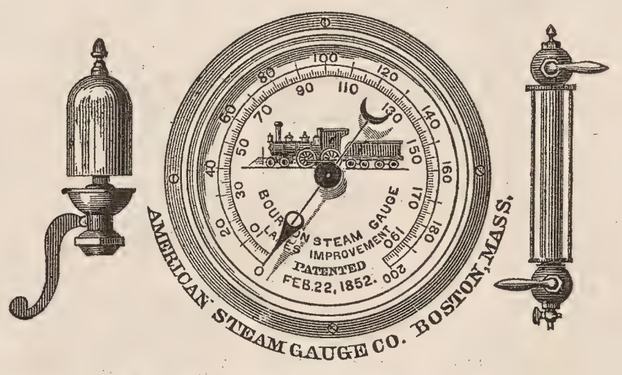

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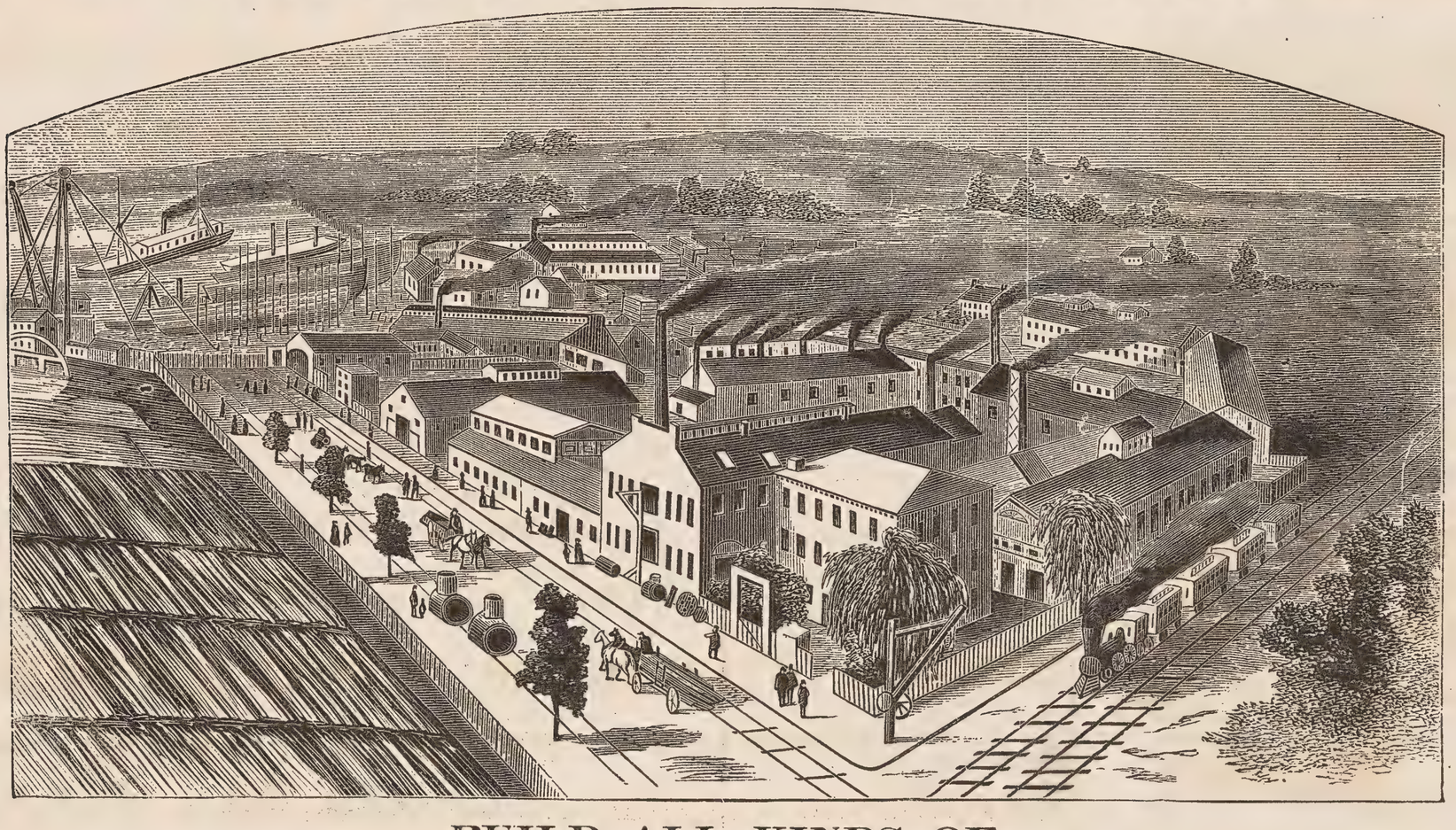

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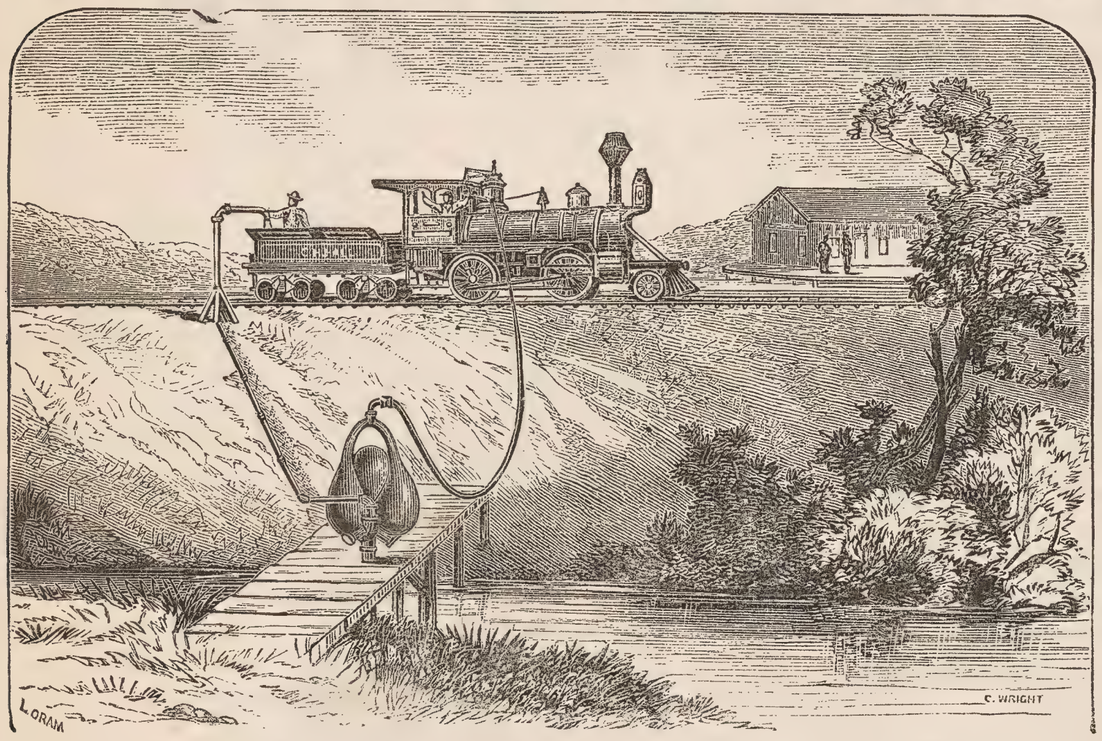

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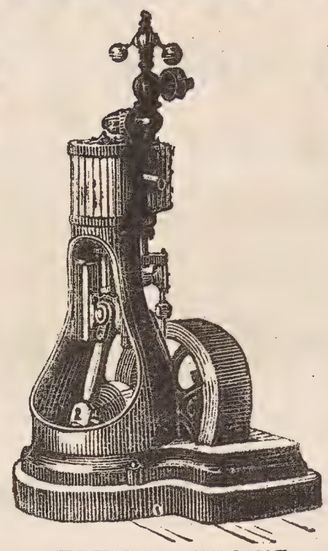

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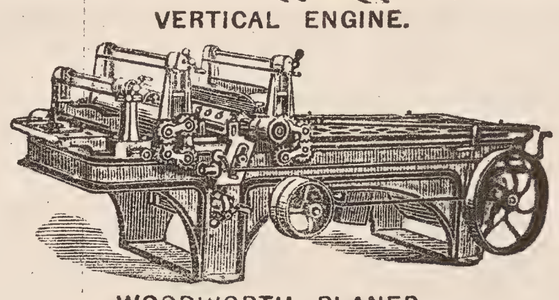

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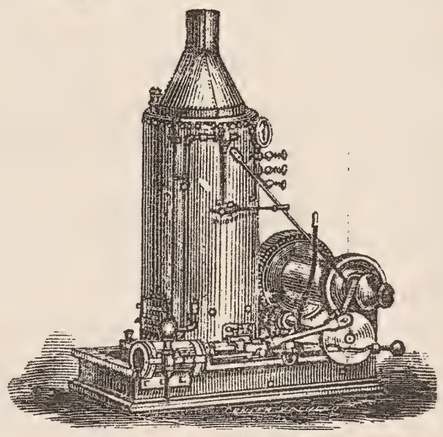

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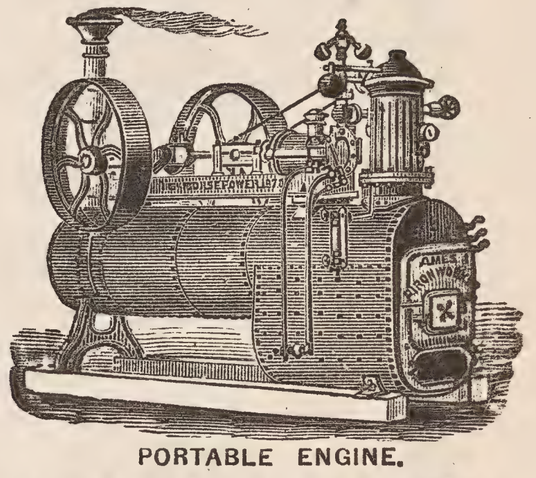

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Vol. IV. No. 12. DECEMBER, 1873. *One Dollar per Annum. Single Copies, 10 Cents.*

Check-Chains.

THE following is the report of the Committee of the Master-Mechanics' Association on the efficiency of check or safety-chains on engine, tender, and car-trucks. We omit the circular issued by the committee, as the questions contained in it are indicated in the report:

To the American Railway Master Mechanics' Association:

GENTLEMEN: Your committee received answers to their circulars from twenty-four different superintendents of motive power, and master-mechanics in the United States, Central America, and Canada. Of this number, nineteen were of the opinion that all locomotive tender and car-trucks should have safety-chains attached of sufficient strength to prevent the truck from assuming a position to run at an angle from the line of the track, in case of ordinary derailment, and to hold up the corner of the truck in case of the breaking of a wheel or axle, and prevent the truck in such case from being torn from its position by the corner falling upon the track and coming in contact with the ties, bridge-timbers, or cattle-guards on the line. One was of the opinion that safety-chains should be applied to engines and tenders only, while three considered them unreliable, and on that account did not attach them to the trucks under the rolling stock in their charge.

Of those recommending the use of safety-chains, ten give it as their opinion that $\frac{7}{8}$-inch round iron should be used for the links in chains to engine-trucks, and twelve consider $\frac{3}{4}$-inch iron sufficient.

For chains to tender-trucks, two advise the use of $\frac{7}{8}$ inch iron for links, fifteen $\frac{3}{4}$-inch iron, and four think $\frac{5}{8}$-inch iron sufficient.

For passenger and baggage-car trucks, twelve are of the opinion that $\frac{3}{4}$-inch iron should be used, and five recommend $\frac{5}{8}$-inch iron; and for the chains to freight-car trucks, nine are in favor of using $\frac{3}{4}$-inch iron, and nine consider $\frac{5}{8}$-inch iron strong enough.

In regard to the length of link for each size of chain, there seems to be but little diversity of opinion; with two or three exceptions, all recommend the standard adopted by chain-makers, known as "cable." The point of attachment of the chain to the frame of the engine, tender or car, is considered best when as near directly over the point where attached to the truck as practicable, by nine, while an equal number believe that the chains should be attached so as to hang diagonally, or nearly in the direct line of the strain in preventing the truck from turning, so as to run at an angle from the line of road in case of derailment. One recommends two chains for each forward corner of engine-trucks attached—the one immediately over, and the other diagonally from the point where attached to the truck. Another considers the point of attachment to the frame should be in a line directly forward of the point where the chain is attached to the truck.

The opinion seems to be unanimous that where safety-chains are used, there should be four chains to each truck; three, however, consider that two are sufficient for each engine and tender-truck, on account of being usually run in but one direction. Eighteen reply that they know of a number of instances where the use of safety-chains, in their opinion, was the means of preventing much destruction of property, and perhaps in some instances the loss of life. It is given also as the opinion of some, that had safety-chains been used in instances that came under their observation, the destruction of property would have been very much less in those cases. In regard to keying the king-bolts and centre-pins of all classes of trucks, so as to hold them securely to the frame or body, there is but little difference of opinion expressed. Sixteen give it as their opinion that the trucks to engines and tenders should be thus secured, and fourteen express the opinion that the king-bolts to car-trucks should also be keyed. Four consider that trucks should not be keyed to the bodies of cars; that in case of a serious accident more harm than good results from holding the truck to the body.

Your committee have carefully considered the answers given to the questions propounded in our circular upon this subject, and the reasons given for the conclusions arrived at by those answering, and as there is in some points a wide difference of opinion, we have thought it best, in order to present the subject to the convention for their consideration and action, to review the subject, taking each of the questions in the order in which they occur in the circular; and where a difference of opinion has been expressed, we have taken the liberty to recommend what in our judgment seems to be the best, giving our reasons for so doing. Your Committee very much regret that so few of the master mechanics, out of the great number to whom circulars were sent, found it convenient, or the subject of sufficient interest to them, to reply, and that our report must on that account be based upon the opinion and views of so small a proportion of the whole number.

1. To the question as to whether it is practicable to apply safety-chains and their fastenings so as to be reliable in cases of ordinary derailment, and in consequence lessening the danger in case of such accidents, there is scarcely any difference of opinion. All seem to agree that if chains are of sufficient strength and properly applied, the results in lessening danger and preventing in many cases great destruction of property, or perhaps life itself, would much more than pay for their application and maintenance. Those giving this as their opinion cite a number of instances coming under their observation, which go to prove that in those instances, at least, it would seem the results were very satisfactory. Of the number of such cases we only cite one or two. The first is that related by Mr. Setchel, of the Little Miami Railroad. Some time during the past winter, both wheels were broken from the back axle in the forward truck under the tender of one of their engines hauling an express train, that seven miles were run after such breakage before any thing was known of the matter, the safety-chains holding the truck up from the rails, the train running along at the usual rate, no other damage resulting. Another instance is related by L. H. Waugh, of the Kansas Pacific Railway, as coming directly under his own observation, where six cars in a freight-train, running off the track at a defective joint, were hauled across a bridge 120 feet long, the safety-chains holding the trucks close to the rails, and the cars passing in that way entirely over the bridge, and receiving but little if any injury, and were afterward drawn on the rails and continued on in the train to their destination. One car in this train that was without safety-chains received so much damage that considerable repairs were required before it could be put in service again. One of your Committee witnessed an instance where the forward axle in the truck of an engine broke while running at the rate of twenty miles per hour with a passenger-train, the wheel running into the ditch, and the safety-chains holding up that corner of the truck until the train was stopped, the other wheels in the truck remaining on the rails; no other damage resulted. A great number of instances can be mentioned where safety-chains have proved efficient; and when of proper strength, but few instances can be shown where they have not been efficient in ordinary cases. Chains will not in *all* cases, nor under *all circumstances*, prove efficient, in consequence of the extraordinary strains brought upon them in case of running over obstructions, or where the trucks are subject to unusual force from accidents other than those resulting from a broken wheel or axle, or simply derailment. There are no mechanical difficulties to overcome in order to secure sufficient strength of chain or fastening to insure efficiency under ordinary circumstances. So far as the trucks under locomotives and tenders, passenger and baggage-cars are concerned, there is scarcely any difference of opinion among master mechanics. All agree that each truck should have good chains securely fastened.

There is some difference of opinion, however, as to whether the benefits to be drived from the application of safety-chains to freight-cars would warrant the cost of application and maintenance: a large majority favoring their application; the minority claiming that whenever such chains are called into requisition, they have almost invariably failed and proved unreliable. The question would naturally arise, if safety-chains can be made sufficiently reliable to warrant their application to locomotive, tender, and passenger-car trucks, and it is a wise precaution to use them, and if experience has shown that in a number of cases danger has been lessened and the destruction of property prevented by their use on the class of trucks referred to, can they not be made equally efficient, reliable, and valuable in their application to the trucks of freight-cars? The statements made in regard to the failure of chains on freight-car trucks are doubtless in many cases true, yet they can not be regarded as conclusive arguments against their use. It is well known to mechanics who have given this subject attention, that safety-chains, as they are applied to freight-cars in a large majority of cases, especially on cars built by contract, are only safety-

chains in name, they are scarcely a good pretext, being either entirely too light, or the fastenings fearfully defective. A very common practice is to bend a piece of $\frac{5}{8}$ or $\frac{3}{4}$-inch round iron into the shape of a hook at one end, the other end being pointed and a thread cut on it; this end is screwed into the side-sill or end-sill of the car to the depth of about three inches, the hook having no other support than that derived from the part screwed into the sill. This furnishes the fastening for the chain, and the consequence is, that when a strain of a few hundred pounds is brought upon the chain, if the latter does not easily break, the "hook" does, or pulls out of the timber, sometimes splitting it in the operation. Other styles of fastening are in common use that are equally unmechanical and as unreliable.

In the opinion of your Committeee, as well as that of a large majority of those giving an opinion on this subject, there seems to be no good reason why safety-chains can not be made as effective and reliable attached to the trucks of freight-cars as when attached to any other class of trucks. It will not be found difficult to devise fastenings for the chains that will be reliable under all ordinary circumstances, and that, too, without any danger of splitting or doing other damage to the frame of the car. The cost of applying good chains and their fastenings to cars would average about $10 each. Estimating the life of a car to be eight years' service, the account to safety-chains would be as follows:

Cost of chains and fastenings	$10 00
Interest for eight years, at eight per cent	6 40
Total	$16 40
Less value of old chains and fastenings	3 00
Total to be charged to account of safety-chains for eight years	$13 40

This would be an average of $1.67½ per car per year. To equip five hundred cars with safety-chains, at the above rates, would represent an annual expenditure of $837.50. Your Committee are of the opinion that safety-chains can be attached to freight-cars so as to be efficient under all ordinary circumstances, and be the means of lessening danger and preventing destruction of property; yet we are not prepared to give an opinion as to whether the advantages to be derived from the use of safety-chains on five hundred cars would average each year $837.50 or not, as compared with the same number of cars having no safety-chains, and we therefore submit this part of the subject to you for further consideration.

2. From the various opinions given as to the diameter of the iron composing the links of chains best suited for the different classes of trucks, we recommend that for trucks under locomotives the chain-links be made of a good quality of $\frac{7}{8}$-inch round iron; for tenders, passenger, and baggage-cars, and for all classes of freight-cars, $\frac{3}{4}$-inch iron be used. The fastenings of the chains should in all cases equal in strength that of the chain attached; the usual proof or test for chains made of $\frac{7}{8}$-inch iron being fourteen tons, and for those of $\frac{3}{4}$-inch, ten tons, which, in our opinion, gives sufficient strength of chain for the purpose designed. For length of links we would recommend that adopted by chain-makers as a standard for the different sizes of iron used, known as "cable." A longer link for chains to freight-car trucks, where considerable length of chain is required, would doubtless answer as well, besides costing less and having a less number of joints subject to wear.

3. There is much difference of opinion expressed as to the best point for attaching safety-chains to the frame or body, relative to the point of attachment to the truck. One half the number of master-mechanics giving an opinion on this subject, are of the opinion that the point of attachment of the chain to the frame or body should be as near directly over the point where attached to the truck as practicable, while the other half give it as their opinion that the point of attachment should be such as to hold the chain diagonally, and, as far as practical, at least nearly in the direct line of the strain brought upon it, in preventing the truck from turning so as to run off at an angle from the line of the track in case of derailment. Each plan has its advantages and disadvantages, and the difference in the conclusions arrived at doubtless arises from the different objects sought to be accomplished. If the object of a safety-chain is simply to hold the truck from falling to the ground in case of a broken wheel or axle, or to hold the truck in place when off the rails and passing over openings, such as cattle-guards or trestles, where under other circumstances the truck would fall from its place, and thus be a serious obstruction to the trucks and wheels immediately behind it, the plan of attaching the chain to the frame or body immediately over the point of attachment to the truck, will best accomplish that object. For instance: if a wheel or axle under the forward truck of a locomotive having good safety-chains attached to the corners of the truck and to the frame immediately over such point, no change of position would occur in the truck in consequence of the weight thrown upon the safety-chain at that corner, and in all probability the other wheels of the truck would not—except occurring on the outside in a curve in the road—be thrown from the rails before the train could be stopped. But if the chain was attached diagonally, so as to be at an angle say of 45 degrees to the direction of the weight to be supported, the strain upon the chain in consequence of the angle would be double that of the weight to be sustained, and the force tending to throw that end of the truck toward the opposite side would be equal to the weight sustained or downward strain, which, unless the flange of the opposite wheel was considerably worn, would be sufficient to cause the flange to climb the rail and throw that wheel off the track. But if the object is only to prevent the truck from assuming a position to go off at a tangent from the line of the track, in cases of ordinary derailment, it is evident that the nearer the chain can be brought to the direction of the force to be overcome the better, and that object can be accomplished best by diagonal chains.

As the accidents against which the use of safety-chains is intended as a means of lessening danger, are of a variety of kinds, it would seem best that some plan of attachment should be adopted that will be a compromise—that will be best in the majority of cases when called into requisition. Your committee are of the opinion that the point of attachment to the frame or body should not be far from that directly over where the chain is attached to the truck, the angle of a line from the point of attachment on the truck to that on the frame or body, and a perpendicular, being about twenty degrees, and in the direction that such angle will be increased most by the turning of the truck from the line of the rails, would, in our opinion, suit all cases better perhaps than any other except chains to six-wheel trucks under passenger or other cars. These should be attached diagonally, as there is but little danger of a truck of that class dropping upon the rails in case of a broken wheel or axle. The point of attachment of chains to the frame of locomotives should be inside, or toward the centre of the track from where attached to the truck, for the reason that in case of a broken wheel or axle the weight thrown upon the safety-chains attached to the frame inside of the point where attached to the truck, will tend to prevent the truck from turning toward the side having the breakage, and will on that account keep the opposite wheel on the rail. The angle of the chain should, however, not much exceed twenty degrees from the perpendicular.

We do not consider that any rule that could be given would apply to all cases equally well, and in the application of chains to the different styles and classes of trucks, some variation from it will be found necessary to suit particular cases. No greater length of safety-chain should be allowed than is requisite in passing the shortest curves upon which such cars or engines are run.

4. There should, in all cases where safety-chains are used, be one attached to each corner of the truck. Upon this point there seems to be no difference of opinion.

5. With three exceptions, all who have replied to the fifth question report instances as coming under their observation where, in their opinion, destruction of property was prevented by the use of safety-chains. It can not be determined what damage would have resulted in these cases had there been no chains used; but, judging from that resulting in cases where such chains were not used, their opinion is very decided in favor of their use. It is not stated by any that to their certain knowledge life has been saved, in instances where chains were used, that would have been lost if safety-chains had not been attached, yet the inference is that such has been the case in several instances reported. If, then, it is decidedly the opinion of the men who have had many years' experience in the care and supervision of the rolling stock on the different railways of the country, that where safety-chains have been applied they have in very many cases prevented destruction of property, it is equally conclusive that their application to all classes of rolling stock will in the same degree contribute to the saving of life; and where the question of human life is concerned, the cost of application and maintenance can not be considered in the question at issue.

6. To the question, whether, as a means of safety, the centre-pins and king-bolts to engine, tender, and all classes of car-trucks should be securely keyed, so as to prevent such pins and bolts being drawn out in case of derailment or accidents from other causes, and thus securing the trucks in their position to the engine, tender, or car, there seems to be but little difference of opinion. All concur in the opinion that in engine and tender-trucks the pins should be keyed, and, with the exception of four, are in favor of keying the king-bolts in all classes of car-trucks; believing that, in very many cases, by having them thus secured to the body, in case of accidents much less injury would occur on the whole. Of those dissenting from this opinion, one concludes that safety-chains are sufficient without the addition of keys in king-bolts, and two give it as their opinion that, in case of a severe accident, the sooner the car-bodies are clear of the trucks the less damage results in most cases. The opinion of the latter, that, in case of serious accidents, it would be best to have trucks freed from the body of the car, is doubtless correct in some cases, yet it is a fact well known to all who have closely observed the matter, that in very many instances much less damage occurred from the fact that the trucks were held in place by keys in the king-bolts than if they had been left free and had drawn out. One of your Committee witnessed an instance where a night express-train was thrown from the track by the washing away of a part of the embankment, and a passenger-coach filled with passengers was prevented from being turned over into the water by the "ballast" given the body of the car by the trucks, the king bolts being drawn out as far as the keys in them would permit. The trucks resting at an angle, on the side of the embankment, were so firmly fixed in in the soft earth that the body of the car was held with the sides at an angle of 45 degrees from the perpendicular, and prevented from turning over into the water by the keys in the king-bolts.

It would seem that, if there are good reasons for securing the trucks of engines, tenders, and cars running in passenger-trains, by keys in the centre-pins, cars running in freight-trains ought not to be an exception in that particular. One advantage claimed in having the king-bolts of cars free to draw out is, that in clearing a wreck no difficulty is experienced in separating the trucks from the car-bodies and removing them separately if desired; whereas, if keyed, it would often be found difficult on that account to separate them, and equally difficult to remove them from the line without separating. This, doubtless, would sometimes be the case, yet many instances occur in which removal would be greatly facilitated if the

trucks had remained in their place attached to the car-body. It will be found that cars are much less likely to turn over in case of accident if the trucks are secured to the body, so that they can not ordinarily be displaced; and in case the car does turn over, the trucks go with it, and are not so likely to be damaged as if left on the road, and in many instances the cars can be turned back and put on the track with but little trouble and slight damage.

A great many instances occur, when cars are thrown from the track, that they require to be jacked up, and the trucks turned somewhat, or require to have blocking put under the wheels, before they can be pulled out of the positions in which they are found and put on the track. In all such cases, the matter is greatly facilitated if the trucks are keyed to the body and can be jacked up with it. Many other reasons could be given in favor of having trucks secured to the body of the car, but your Committee deem it unnecessary. The expense of putting keys in centre-pins and king-bolts is so trifling as to be scarcely worth mentioning. In accordance with the almost unanimous opinion of all who have expressed themselves to us on this subject, and our own observation, we believe that on the whole much less damage would result in case of accidents if centre-pins and king-bolts of all classes of trucks were keyed, and we recommend it as a means of safety.

Respectfully submitted,

R. Wells,
Jeffersonville, Madison, and Indianapolis Railroad.
C. R. Peddle,
St. Louis, Vandalia, Terre Haute, and Indianapolis Railroad.
J. L. White,
Evansville and Crawfordsville Railroad.
} *Committee.*

A New Spark-Arrester.

Various plans for arresting sparks and cinders have been experimented upon ever since locomotives have been used; but out of nearly a hundred applications and thirty patents granted by our government, not one so far has been of practical use, because they all stopped the draught and prevented the engine from making steam as rapidly as necessary. At present, many of the locomotive smoke-stacks are covered with a wire screen, but it gets clogged with dirt and stands seriously in the way of easy and regular working of the engine. A man with a poker is frequently obliged to go to it on the way between stations and punch the screen clear so as to allow the engine to make steam easily.

Colonel W. D. Farrand, formerly our consul at Callao, invented a machine for arresting sparks, went to Paris, and introduced it on one of the French railways running out of Paris, and came here a few months ago and obtained a patent for it. He then obtained permission from the New-York Central and Hudson River Railroad Company to attach it to one of the dirtiest engines in their shops for the purpose of testing its capacity. Mr. Buchanan, the master-mechanic of the road, took the experiment in charge, and on the 12th ult. started with a full passenger-train from the Thirtieth street depot, and run to Tarrytown and back. He says the experiment solved the problem of preventing fires along the road and cinders getting in the eyes of passengers. The conductor of the train says it was the first time in his life that he could stand on a platform of one of his cars without getting struck in the eyes or having his neck burned with cinders, and his face blackened with soot from the smoke-stack. The car windows were thrown open, and the conductor says that while heretofore they have swept bucketfuls of cinders from the interior of the cars, not a cinder was to be found after the sixty-mile run.

The smoke and non-consumed products of combustion ascend a curved flue and empty into a laterally enlarged chamber, from which they are driven by exhaust steam through a tube from the receiving chamber into a receiving box below. When this box fills, a valve is thrown open and the contents emptied upon the track. The length of smoke-stack greatly increases the draught. The advantages shown by this trial are four. With such appliances the traveling public need no longer be annoyed by sparks, cinders, and soot, but may leave their windows open with impunity. The owners of property along this road may build their haystacks and barns, or plant their crops as near the railroad as they desire. The railroad companies may use open cars for combustibles of great bulk and save a good deal of trouble in handling, while at the same time the increased draught will give them much more steam with the same amount of fuel; because a slow draught makes heated air and uses the fuel to less purposes, while a strong draught makes steam as fast as the engineer wants it.

Automatic Car-Coupling.

The invention illustrated in our engravings is a new form of car-coupling, which, while it connects the cars automatically as they are brought together, allows of the uncoupling of the vehicles from either their tops or sides. The device is claimed to operate perfectly on the sharpest curves and steepest grades, and to bring the cars as closely together as the ordinary drawheads now used. It is attached to the carriages in the usual manner, with perhaps somewhat more up-and-down and sideways play.

From Fig. 1, the construction will be readily perceived. A is the drawhead of one car made with a cavity of sufficient size to receive the connecting draw-

Fig. 1

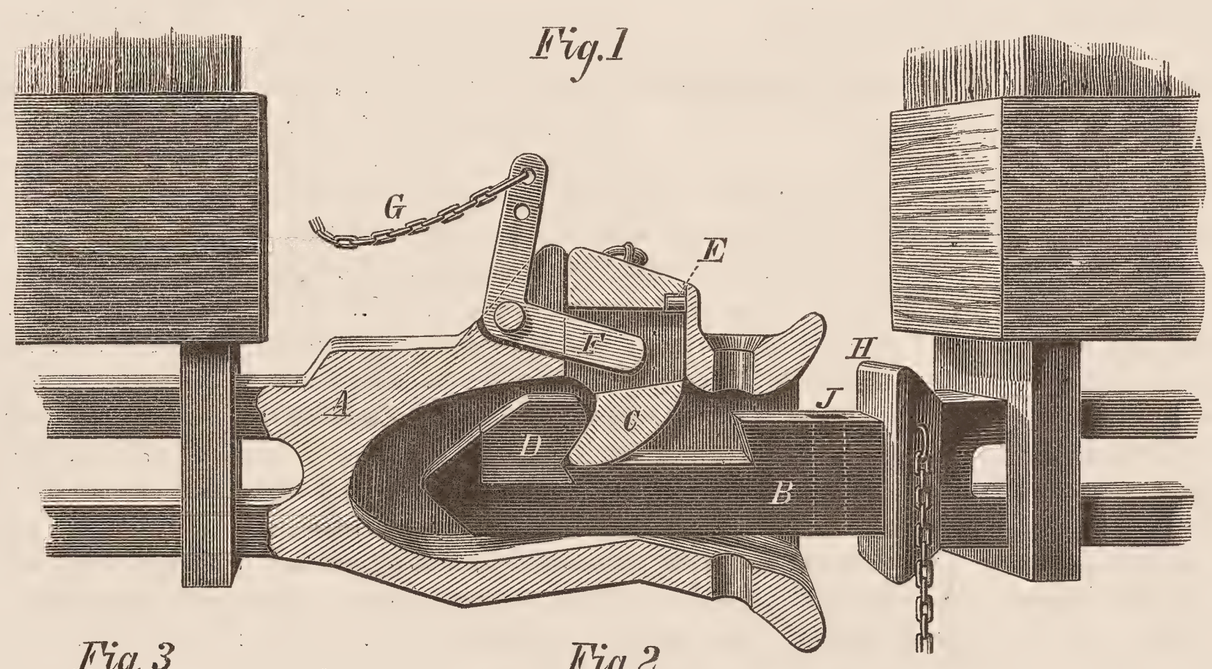


Fig. 3

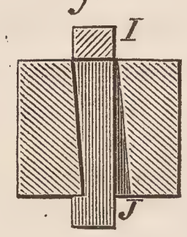
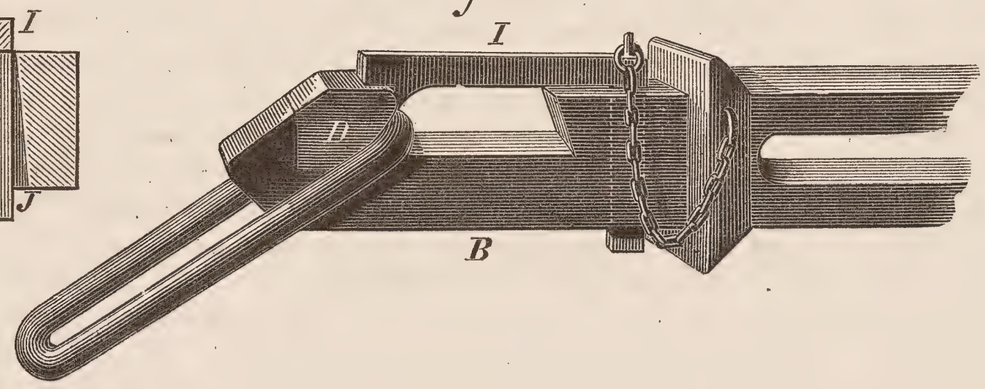


Fig. 2



head B. Fitting into a recess in A, so that its lower and hook-shaped end may project down into the hollow portion, is a steel coupling-block C, which engages with another steel block D, dovetailed and bolted to the drawhead B. The block C is provided with a ring or handle at its upper portion to admit of its being readily lifted out by hand, when it is so desired, to uncouple the cars, while its movement is limited by a pin or screw E, working in a suitable groove on its surface. When raised, the coupling-block C may be held up by a pin placed in a hole therein and above the drawhead.

Pivoted in a slot in the upper part of the latter is a bent lever F, of which the forward arm enters a slot in the coupling-block, so that, by suitably operating the lever, said coupling-block may be easily lifted up, and the cars thus uncoupled. This is effected by a chain G, attached to the upright arm which, passing over suitable rollers, connects with one lever near the top of the car, and with two other levers attached to the sides of the vehicle.

The draw-bar B has a collar H, to prevent its being forced too far into the opposite drawhead when the cars are brought together.

A point claimed as of considerable advantage in the invention is the facility with which it may be adapted to connect with and in the same manner as the common form of drawhead. In the forward part of the bumper A is a hole for a coupling-pin which secures one end of the link. The other extremity of the latter slips over the coupling-block D, where it is held in place by a square angle-bar I. One portion of this bar drops into a square though somewhat inclined hole in the drawhead B at J, and its lower extremity, being notched, locks itself in. This will be more clearly understood from the section shown in Fig. 3. The horizontal portion of the bar I simply rests along the top of the drawhead B, and terminates in an end angled to fit the corner of the block D, thus securely confining the link.

The inventor, Mr. Franklin E. Howard, of Geneseo, Livingston County, N. Y., may be addressed for further particulars.

Abram S. Hewitt, the Receiver of the New-York and Oswego Midland Railroad, states that when he took charge of the road, the wages of the operatives had not been paid for four months, and that there was due them $459,000. The expenditures exceeded the receipts $3000 a day, and there were no supplies whatever, not even a ton of coal. He had succeeded, however, in materially reducing expenses so as to bring the October excess of expenditures down to $1000 per day, and it was probable that in November there would be no excess at all, and that the men would be paid their current wages in full. The operation was a surgical one, but he thought the patient would live unless the legitimate business was too much reduced by the prevailing crisis. With time for development and with expenditure of capital, the road could be made to pay interest on a moderate cost. The actual cost of the road in cash was probably over $25,000,000. There was little "watering" done—in fact, there was little or nothing to water.

The shops of the Pennsylvania Railroad, at Altoona, have reduced their working force about one fifth, and from ten to eight hours per day. No further reduction will probably be made. The freight business of the road requires more locomotives and constant repairing of cars. There is a large demand for Western grain-transportation, while the coal and other products ordinarily transported, have suffered no material diminution. Over thirty locomotives are now in the shops for repairs. Such is the tax upon this branch of rolling-stock, that many passenger locomotives are being used in the freight service. The shops at Altoona are becoming too small for the necessities of the road.

A New Ventilator.

A NEW method of ventilating passenger-cars, the invention of Judge S. C. Maine, of Boston, was recently tested on the Eastern Railroad, the experiments being witnessed by a number of leading railway officials during a trip from Boston to Portland and return. We copy the following account from *Whitney's Railway Chronicle*:

"The invention consists simply of a small compound air-box, one part of which is outside and the other part on the inside of each window of the car, and is directly under the control of the passenger. The external portion of the box is furnished with a valve-door at each end, so that, whichever way the car may be moving, one of these valve-doors will be open and the other closed. The aperture is slightly enlarged so as to give free admission to the air, having the momentum given to it by the moving train. The air passes from the outside to the inside box, directed upward through a fine wire-netting, intended to exclude not merely cinders but the finest dust from the flue of the locomotive. This compound air-box, so to call it, is the ventilator; and the entire process is simply that of introducing the external air into the car in a particular way, and deflecting the current at right-angle upward immediately upon its entering the car. By thus deflecting the rising air, it impinges upon the top of the car, diffusing itself and moving at the same time the air from the floor to the monitor-top, and thus changing the entire air of the car. This process is claimed by the inventor to be in effect the revival of the old open fire-place method of ventilation. Another object of this arrangement is to avoid incommoding the passengers, as opening of a window is likely to do; to exclude cinders and dust, and to change constantly the air of the car. It will be seen, from what we have said, that the invention is perfectly simple and the process equally so. Of course, the ventilators, so called, in the monitor-top cars, are necessary to the working of Judge Maine's ventilator, and must be considered as a portion of the machinery, unless some other form of exhaust is adopted.

Judge Maine claims that his invention admits the air, excludes the dust, gives movement to the air in the car, and enables him to change the whole volume in the car, even down to the floor, in six or seven minutes. This is all that is required, and if the claims of the inventor are to be considered as demonstrated, the object is accomplished. The experiments introduced by Judge Maine, by coloring the air of the car and then removing it by opening the ventilators and the exhausts, were intended to illustrate the working of the apparatus, and this operation was perfectly successful at each repetition, so far as shown by the entire removal of the smoke. This experiment was varied by coloring the air in the car while the exhausts in the monitor-top were left open; the air remained immovable, and was only put in motion by the opening of the ventilators in the windows, showing that without the ventilators, or some equivalent for letting the air into the lower portions of the car, the exhausts were in a great measure useless. This was demonstrated by repeated experiments, and of course impairs the confidence of those who have heretofore relied upon the openings in the turret for the movement and purity of the air, and that which these exhausts alone will not do, is readily done by the use of this method. The speed of the train undoubtedly had much to do with the change of the air in the car; the more rapid the movement the quicker the coloring matter disappeared. Not so with the ventilators now in use in the monitor-tops; for the test showed that the more rapid the motion the less their action.

On the return trip, a meeting of the passengers was held to express their opinions in regard to the invention and its operation. The meeting, of course, was not very favorable for the interchange and comparison of views among the railroad men. But, as a general conclusion, the experiments were deemed successful and highly satisfactory. It was remarked by one of the speakers, that at least a very important step had been made in the art of ventilation, and one which was practically useful, as had been demonstrated. Whether it might not be desirable to have a less number of ventilators, and those near the floor under the control of the conductor, than one at each window under the control of the passenger, was spoken of as deserving consideration; and this could be done, if thought desirable, on the principle of the present patent. At all events, the speaker remarked, it was gratifying to know that attention had been given to the subject, and that it had assumed a practical form, which would surely lead to the accomplishment of the object. It was generally admitted that, in the trip to Portland and return, a very full trial was made of Judge Maine's ventilator, and the results, as we said, were deemed both successful and satisfactory. A model was shown by which the ventilator, slightly differing in form and make, might be introduced into a car in the process of construction at very moderate expense. The ventilators used in the experiments may be applied to any car with trifling alteration.

It is to be hoped that this invention will be at once introduced into some of the cars on our railroads, in order that it may be thoroughly tried in daily work, as, for example, in the smoking-cars, where ventilation is especially desirable, and where, it is believed, it would prove effectual in keeping the air of the car pure. No better test could be provided for each railroad company to try the invention for itself, and, if satisfactory, it should at once be generally adopted.

During the trip spoken of above, the following-named gentlemen were constituted a committee to draw up resolutions embodying the sense of the meeting: Robert Johnson, Albert A. Folsom, Charles O. Russell, Roland Worthington, George O. Carpenter, Jeremiah Prescott, John Mulligan. After a short retirement, the following resolution, signed by all the committee, was presented and unanimously adopted:

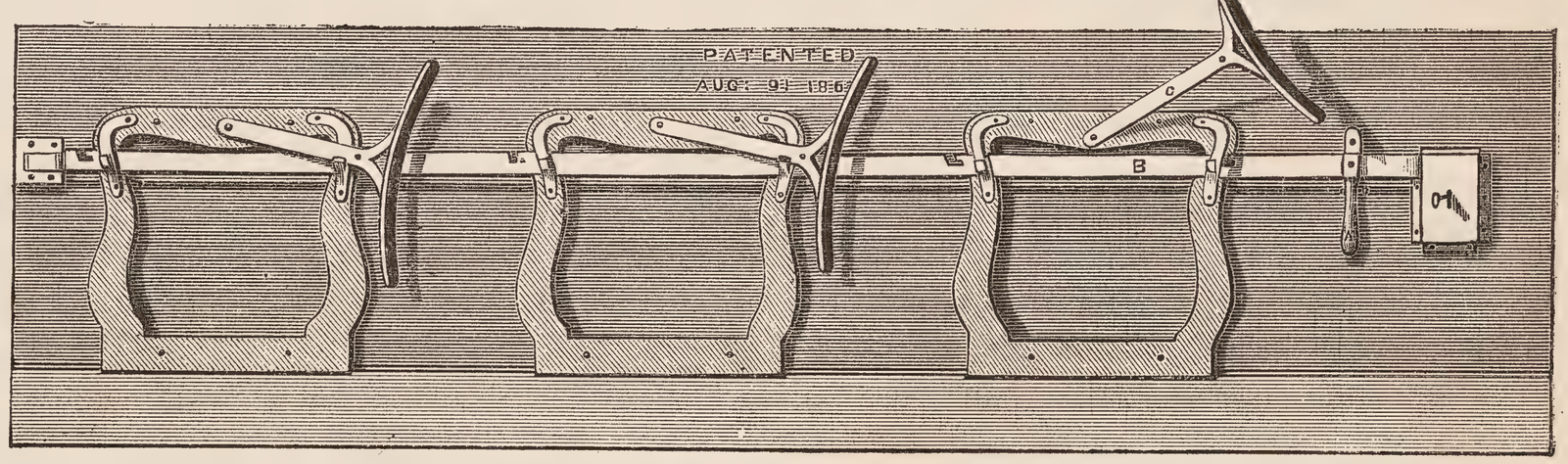
Whereas, The matter of proper ventilation of railroad-cars has been the subject of considerable discussion among railroad managers and the traveling public for a long time, and through the courtesy of the Eastern Railroad we have had an opportunity of witnessing the various experiments for ventilation under the patents of Judge S. C. Maine; it is

Resolved, That it is due to him that a proper recognition of the ingenious and successful experiments made by him to-day should be made known, and so far as the results of to-day's experiments are concerned, they are entirely satisfactory.

The same device was applied a few days previously to an ordinary street-car. In this trial, the car being in motion and the door and windows being closed, a chemical mixture was set on fire and permitted to burn on the floor of the car until it was so filled with the fumes and smoke that respiration was difficult. In two minutes from the time the mixture ceased to burn and give out smoke, the atmosphere of the car was so far changed that respiration was easy, and there was but little color or smokiness. In three minutes more, the atmosphere was clear. During the color, the smoke, escaping from the ventilator, could be seen by persons outside the car, as plainly as the smoke from a fire of wood escaping from a chimney. The pure air, introduced from without, was so distributed as to accommodate equally persons sitting or standing, and yet so devoid of current as not to be perceptible to persons in either position or in any part of the car. We are satisfied from this experiment, as well as from that described above, that the great problem, acknowledged to be at once the most important and the most difficult one pertaining to traveling in crowded cars, whether drawn by steam or horses, has at length been solved."

Since the above was put in type, Judge Maine has visited our city and placed a model, showing the application of his method to railway cars, in the rooms of the Car-Builders' Association, 113 Liberty street. He also fully explained its peculiarities and mode of operation at the monthly meeting on the 20th ult., a report of which will be found on another page. He informs us that the Eastern Railroad Company have decided to place his ventilators on fifteen new passenger-cars that are soon to be built, and that the South-Boston Street-Car Line have also decided to adopt them—ED. CAR-BUILDER.

BAKER'S SEAT-BACK LOCK.



Baker's Seat-Back Lock.

THE cut illustrates a device patented by David H. Baker, of Jersey City, N. J., by means of which all the seat-backs on either side of a car can be locked by a slight movement of the lever A, which operates an iron sliding-bar B, let into the inner side of the seat-arms, and secured by the seat-hooks. This bar extends the length of the car-side, so as to embrace all the seats. The back-irons have pins attached to them which drop into L-slots in the bar, in which position all the seats may be locked or unlocked at pleasure. The locking is effected simultaneously without regard to the position of the backs, whether thrown all one way or otherwise, or whether the seats are occupied or not. A key-lock, as shown in the cut, is also provided, so that the locking bar can not be moved except by the conductor or train-hands. The device is simple and substantial in its construction, can be easily applied both to old and new cars, and with less cost, it is claimed, than any other seat-lock in use. It has been in successful operation for three years on the New-Jersey Division of the Pennsylvania Railroad, and also on other roads. The patentee may be addressed as above.

THE Port Huron and Lake Michigan, and the Peninsular Railroads, have been consolidated under the name of the Chicago and Lake Huron Railroad. The entire line extends from Port Huron, Mich., to Valparaiso, Ind., and is complete, except a gap of 45 miles between Flint and Lansing. This will be completed next summer, when there will be railroad communication between Port Huron and Chicago.

THE creditors of the Ohio Falls Car Company met at Louisville on the 12th ult., and received a statement of the condition of the company, showing assets amounting to $1,237,102 and liabilities about $717,899. After a thorough examination of the statement, an extension was granted, and in a few days the works will be again in operation.

English Railways.

A CORRESPONDENT of the Chicago *Tribune* says: "Railways in England are built with a care and perfection never seen in America. They are constructed regardless of expense. The grade or direction conforms very little to the face of the country. The lines are straight, turning neither to the right nor left hand to avoid natural obstructions. If low hills are met, they are cut through; if valleys, they are filled; if high hills, they are tunneled; if rivers interpose, they are arched over with stone bridges; or, if the spring is too long for a stone arch, they are spanned with iron. Embankments or deep cuts are either lined up with stone walls or smoothly sodded, so the naked earth is rarely seen. All public highways are either carried over the tracks on stone or brick viaducts approached by easy grades, or are crossed by the railway on an iron or stone bridge. The railway never crosses a public road on the same grade or level.

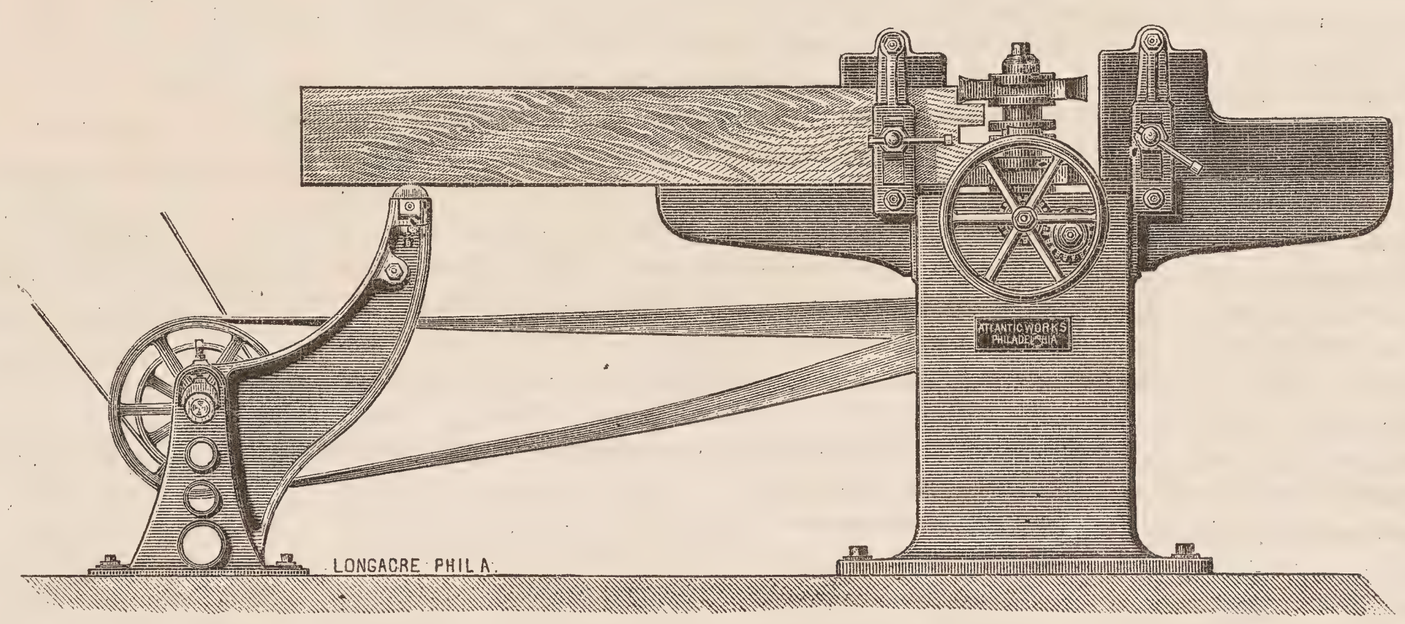
"In passing into or through cities, the railway-track nearly always runs on a 'high level.' The roadway usually consists of a series of brick or stone arches, elevated about 20 feet above the surface of the ground, and under the arches the traffic on the street passes without danger or impediment. The trains are thereby enabled to run into depots and through cities as fast as the companies please to run them. On the express-trains I have dashed through cities and towns, or, rather, over them, at the speed of forty to fifty miles per hour, looking down on the house-tops of the long rows of tile-covered brick cottages, and taking in the whole place at a glance from a sort of bird's-eye view. The railway-lines have all double or quadruple tracks, (except the merely local roads or short feeders.) Steel rails are laid on the principal lines, and all the lines are getting them as fast as steel can be manufactured. I was told that experience proves steel to be more than ten times as durable as iron. Some railroad-men declared that a good steel rail would outlast twenty relays of iron.

"The traveler is impressed with the enormous magnitude of the railway traffic of Great Britain by meeting twenty trains an hour flying past him; rarely longer than five or ten minutes intervene between trains. And every half-hour or so, he crosses some railway-line, and sees trains sweeping through the country in almost every direction. The tracks of different railways, so far as I observed, never cross each other on the same level; one always 'viaducts' over the other, approaching it on a high embankment or series of arches."

American Sleeping-Cars Abroad.

THE Continental railroad companies have at last awakened to the necessity of sleeping-cars on their railroads. Col. W. D. Mann, of the United States, is the prime leader in the movement, and has commenced the introduction of sleeping-cars on the Pullman system, which bids fair to be as successful as that company has been on the other side of the Atlantic. It is called the Mann Boudoir Car-Company, and they have established extensive shops at Brussels. Thus far they have turned out but few cars, though a large number are in course of construction. The engineers of Europe persist in limiting the length of the car to thirty-five feet, about half the length of our palace-cars, and consequently the company has been compelled to build their cars on this scale. The body of the car is divided into four separate compartments or state-rooms, each being capable of being converted at night into four coaches, and thus carrying but sixteen persons. They also have wash-rooms and all the conveniences of the Pullman car, and are finished with equal ornamentation and elegance. There are inferior cars on some of the roads, but not sufficient to supply the demand, as on our recent trip from Cologne to Paris it was necessary for travelers to engage them three days in advance, and speculators frequently buy up tickets and hold them for an advance, as is the case with almost every thing in Europe.

One of these cars has just returned from an experimental trip of 2000 miles on the continent, filled with Parisian editors, all of whom are extravagant in their laudations of its comfort and convenience, and express wonder that they have not been introduced sooner by the railroad companies. The great difficulty has been that the European railroad system is cut up in so many companies, and the coöperation is so poor that the passenger is frequently compelled to change cars once or sometimes twice in a night's journey, or to be hauled out of the car with all his valises and bundles for the examination of baggage on the frontiers. The furnishing of cars by the company to be used on all the lines between the main cities is therefore more essential in Europe than in the United States, and there is no doubt that the Boudoir Company will be a great success.—*Exchange.*



Improved Tenoning-Machine.

WITHIN the last few years, great progress has been made in the application of machinery to car-building purposes, and especially in the wood-working department. The length and size of sills and other parts of the car-frame require for their expeditious handling and cutting, machines of peculiar design and adaptation. One improvement has succeeded another, until the time and labor expended in preparing and dressing lumber have been reduced to a minimum, thereby greatly lessening the cost of construction. Sawing, planing, mortising, and tenoning are, in most car-shops, done by machinery. Of these several operations, that of tenoning is one of the most difficult, and where the frame-timber is moved on carriages to receive the action of the cutters, requires as much floor-room as the process of planing. The first attempt to remedy this defect and economize shop-room was in the construction of tenoning-machines with a feeding movement of their cutter-spindles, so the lumber could remain stationary while the cutting was performed, thus doing away with the necessity of long carriages to give the transverse movement to the timber. This improvement suggested and was followed by another, the design of which was to overcome the remaining difficulty of reversing or turning the stick end for end after the tenon was formed on one end. The inconvenience of turning a piece of lumber, from 18 to 40 feet in length, in a crowded shop, is very great, and sometimes almost impracticable. There was also another objection to this plan of tenoning, namely, the inaccuracy of gauging from opposite sides of the lumber, a most unmechanical operation, and amounting in practice to the same thing as working from "two sides of a piece," as it is termed in shop parlance.

To remove this difficulty, double-action machines, cutting right and left or up and down, were introduced by Richards, London & Kelley, of Philadelphia; those with the vertical action were made early in 1872, and those with the horizontal action were introduced in England, during the summer of the same year, by Mr. Richards. The cut illustrates the horizontal machine as constructed by this firm, the cutters being in the form of an adze, of solid steel bars, after the French method, in which the cutters act transversely across the end of the wood. This improvement leaves little else to be desired in the way of forming tenons by machinery. The timber moves continuously in one direction, and the tenons are gauged from the same side of the stick at either end. The construction and operation of this machine are so fully represented in the engraving as to require no further description.

Ancient and Modern Bridges.

THE knowledge of the arch as a method of construction with stone or brick—both of them materials aptly fitted for resistance under pressure, but of comparatively no tensile strength—enabled the Romans to surpass all nations that had preceded them in the course of history in building bridges. The bridge across the Danube, erected by Apollodorus, the architect of Trajan's Column, was the largest bridge built by the Romans. It was more than three hundred feet in height, composed of twenty-one arches resting upon twenty piers, and was about eight hundred feet in length. It was after a few years destroyed by the Emperor Adrian, lest it should afford a means of passage to the barbarians, and its ruins are still to be seen in Lower Hungary.

With the advent of railroads, bridge-building became even a greater necessity than it had ever been before, and the use of iron has enabled engineers to grapple with and overcome difficulties which only fifty years ago would have been considered hopelessly insurmountable. In this modern use of iron, advantage is taken of its great tensile strength, and many iron bridges. over which enormous trains of heavily loaded cars pass hourly, look as though they were spun from gossamer threads, and yet are stronger than any structure of wood or stone would be.

The chief bridges of ancient times were built as great public conveniences upon through-ways over which there was a large amount of travel, and consequently were near the cities or commercial centres which attracted such travel, and were therefore placed where they were seen by great numbers. Now, however, the connection between the chief commercial centres is made by the railroads, and these penetrate immense distances, through comparatively unsettled districts, in order to bring about the needed distribution; and in consequence many of the great railroad bridges are built in the most unfrequented spots, and are unseen by the numerous passengers who traverse them, unconscious that they are thus easily passing over specimens of engineering skill which surpass, as objects of intelligent interest, many of the sights they are traveling to see.

MR. JOHN J. STEVENS has been appointed by Judge Blatchford joint receiver of the New-York and Oswego Midland Railroad Company, to act with Abram S. Hewitt.

A New Sleeping-Car.

THE *Baltimore American* notices the arrival in that city on the 10th ult., from Philadelphia, of a beautiful new combined palace sleeping and parlor-car, invented and patented by Mr. Jonah Woodruff, of that city. The improvements which this car possesses were first patented in 1871, and are now in use on many of the principal Western railroads. The car is named the "Cleopatra." The exterior appearance of this car is very beautiful. It is painted a deep maroon color, picked out in gold arabesque. On each end of the car is a vestibule, constructed as a rotunda, and arranged so that, when the doors are closed, two beautiful private apartments are formed, in which there are seats, tables, water-stands, water-coolers, and water-closets. The front one of these vestibules is set apart for the use of ladies and children, while in the one at the rear the gentlemen passengers can smoke, play cards, or otherwise amuse themselves, and at the same time be secluded from the view of the other passengers. The ceilings of these rotundas are composed of papier maché beautifully frescoed. The car is heated by steam-pipes that are attached to each seat, instead of the side of the coach, as in many others of a different pattern. On entering the main saloon of the car, the beholder is struck by the fact that it in no way resembles the ordinary sleeping-car until the beds are arranged. The upholstery in this car is most magnificent. The window-curtains and hangings are truly gorgeous, and together with the large French plate-glass windows, luxurious crimson velvet-covered seats, and fancy globe lamps, make the car seem like a drawing-room. In fifteen minutes this scene can be changed, and by an ingenious mechanical contrivance each of the seats becomes a bed, while a second one is drawn out of the paneling in the side of the car, and forms the second, or upper "bunk." The ease and rapidity with which the car can be transformed into a sleeping-apartment is astonishing. The beds and bedding are stored in and beneath the seats; this alone is said by railroad men to be a great advantage, as in the old-fashioned sleeping-car all the sleeping appurtenances were encased in the side of the car and near the roof, thus rendering the car top-heavy and more liable to topple over than when the weight is near the centre of gravity. By arranging the beds and bedding in this way, a top weight of about 5000 pounds is saved, and the car made that much lighter.

Manners on the Train.

No place where people are indiscriminately brought together is more favorable for the exhibition of well-bred courtesy or the lack of it, than the ordinary railway passenger-car of this country. It is strictly a democratic institution accessible to all, and in which one person is as good as another, provided he has paid his fare. Equality is assumed, and social and class distinctions ignored, at least for the time being. Under these circumstances, it is easy for an intelligent observer to detect those who have been educated under refining influences, or those who, without special cultivation, are possessed of native politeness. It is not education alone, nor wealth, nor high social position, that makes one a pleasant traveling companion. There must be, aside from these, an instinctive recognition of individual rights, a kind and respectful demeanor toward strangers, with no desire to appropriate more than a due share of the comforts and conveniences provided for all. One meets in traveling many people of this description, and very many also who do not answer to the description at all. How frequently do we see men whose dress and external make-up would not suggest a very near relationship with swine, enter a finely upholstered car, reverse one of the seat-backs with a whack, and with the most serene indifference to all considerations of propriety, plant their hoofs on the cushion before them which has just been occupied, and perhaps soon will be again, by ladies in elegant apparel. The desire to elevate the feet is so uncontrollable with many, that if dislodged from the seat-cushion, they immediately find a resting-place on the seat-arm, making a sort of door-mat of the passers-by in the aisle. Another piece of ill-breeding consists in filling a seat with luggage and then fall to reading a newspaper or pretend to be asleep, while others who have paid as much as they have, are looking in vain for a seat. Bracing one's knees against the back of the seat in front of them, especially if the back is not made rigidly fast to the side-irons, is as grossly uncivil as it is annoying to the occupants of such seat. Some kill time by whistling their favorite tune, which is very soothing to the rest of the passengers, and particularly those afflicted to any extent with nervous irritability! Now and then a devotee of "fine-cut" expectorates at a mark on the floor of the passage-way, and after an hour's practice at the target, quite a sizable puddle is formed for the convenience of ladies wearing long skirts. There are other violations of propriety somewhat less aggravating than those we have named; but which are equally characteristic of the ill-bred, among which may be mentioned loud talking, argumentative controversy, eating peanuts, and the like.

It is no wonder that the special car system and the protection afforded by the payment of special fares, are so acceptable to a large class of travelers. These, however, are not so available for way passengers going short distances. Nothing is left them but to submit with as good grace as possible until a better code of traveling etiquette obtains recognition. This we shall have when public conveyances cease to be regarded by so many people as private carriages, chartered for the time being for their own special use, all other occupants being ignored or looked upon as intruders. It is surprising how much the pleasure of a journey, whether long or short, is enhanced by the practice of civility and politeness, even if it requires a little patience and self-denial. The nameless little courtesies to strangers, accompanied with a modicum of native tact and delicacy, will go far to compensate for the lack of the educating and refining influences of the best society. No railway regulations or legal enactments even, can enforce civility beyond a certain limit. The rest must depend upon the individual. Nor can such rules or statutes transform a cart-horse into a carriage-horse; but with a little aid and coöperation on the part of the animal himself, a change can be wrought which is the next best thing to it.

MR. LEANDER GAREY, for many years master car-builder of the New-York and Harlem road, has been appointed superintendent of all the car-shops of the New-York Central and Hudson River Railroad and its branches, including the car-shops of all leased lines. Communications relating to his department should be addressed to him at the Grand Central Depot, New-York City.

MR. DAVID HOLTZ has been appointed "Supervisor of Rolling Stock" of the Erie Railway, with headquarters at Jersey City. His duties will be those of general master car-builder of the whole line, and he will have charge of all matters pertaining to cars, including all the car-repair shops of the road. Mr. Holtz is from the Baltimore and Ohio Railroad, where he began his career in 1856 as errand boy in the office of the Master of Machinery. By industry, energy, and hard study he has earned the position which he now fills.

THE Chicago and North-western Railway Company have commenced moving the workmen from their old shops, within the city of Chicago, to the new ones west of Central Park. The machine, blacksmith, and boiler shops and the engine-house are now completed, and are receiving their machinery. The company expect to employ about 800 men this winter; and next summer, when the shops are completed, employment will be given to something like two thousand men.

THE New-York Central and Hudson River Railroad Company are making extensive improvements at Little Falls. A new round-house is nearly completed, and plans have been prepared for two large repair-shops and another round-house. A new road-bed for the main tracks is being graded along the banks of the Mohawk, and the road-bed across Skinner's Flat is being widened. The company is widening the river, and using the earth so obtained for filling in across the flat.

THE latest plan for building railroad-cars is the invention of Mr. Stiles, of Bridgeport, Ct. The model is constructed of brass tubing; the only wood used is in the flooring of the car and the platform of the trucks. The patent is designed to supersede the wooden cars now in use. A saving is claimed for the improvement of a quarter in cost of construction, a quarter in weight, and that the cars so made will be one third stronger.

THE Wason Manufacturing Company, of Springfield, have shipped ten of the Texas and Atlantic refrigerator-cars, the first shipment of an order of fifty cars for that road. The ice-box in these cars is on the top, and is about 15 inches high, 4 feet wide, and extends the whole length of the car; it will hold about a ton of ice. Inside the car there are racks for hanging meat, and shelves for holding small articles.

THE Eastern Railroad Company are laying steel rails at various points on their road. The heavy trains so frequently passing over the Eastern use up the iron rail in about two years, and steel now is used in renewal of rails on the main road.

THE recent suspension of the Cummings Car Company, of West-Bergen, N. J., was caused by the failure of the New-York and Oswego Midland Railroad to pay for a number of cars which had been built for them. The cars, however, are the property of the car company, and will probably be rented to the road. The company have also other cars on hand, ordered by railroads, which are now unable to pay for them. Mr. W. H. Chaddock has been appointed Receiver; and the affairs of the company are in such a favorable condition as to make an early resumption probable.

MR. W. E. RUTTER, who recently resigned his position as master car-builder at Elmira, N. Y., on the Erie Railway, had been in the service of the company for twenty-three years, and was the oldest master car-builder on the line.

Mr. C. A. SMITH, late master car-builder of the Erie Railway, had been in the service of the company twenty years, all the time at Piermont and Jersey City. There are few instances in America of so long a period of service for a single company.

MR. S. B. CRAWFORD, for some time master mechanic on the Baltimore and Ohio Railroad in Wheeling, W. Va., having been recently transferred to the Parkersburg shops, was presented with a handsome gold watch and chain by the employees of the Wheeling shops.

STEEL rails put down in 1865, in the switch-yard of the Chicago, Rock Island, and Pacific Railroad, in Chicago, are good yet. They have worn down about ¾ of an inch, but it is a smooth, even wear, without lamination. Iron rails in the same place required to be renewed every six months.

THE South-Boston Railroad is applying to its new cars, and those which require repairs, an invention which is thus far confined to this road, and for which a patent has just been granted to Mr. John Hogan, the master-mechanic. The invention mentioned consists of detachable facings which can be speedily and cheaply applied to the axle boxes and jaws, and when worn replaced by new at an inconsiderable fraction of the expense attending new jaws and boxes, and in an equally small fraction of the time usually required. The plan is equally applicable to steam or horse railroad-cars.

Car-Roof Construction.

A RECENT number of THE CAR-BUILDER contained an illustration showing the method of fastening iron carlines to the car plate. The deck was represented with a perpendicular side framed of thin stuff and the iron passing up on the outside. As this style of roof is becoming, as we think, deservedly popular, and as some of our readers desire farther particulars as to the

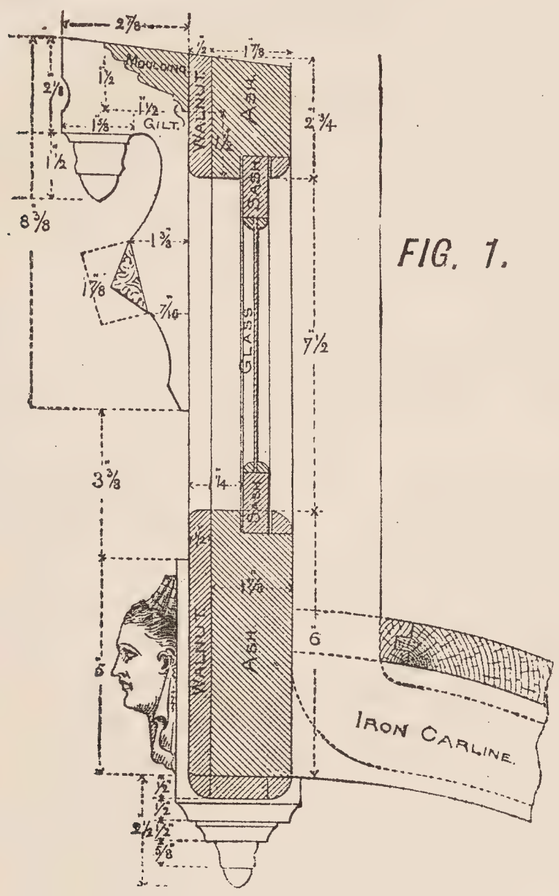


FIG. 1.

Scale, 2 in. to 1 ft.

method of framing the side of the raised deck, we now give some illustrations showing the details of construction and finish. The material used is ash plank, usually about 2 inches thick in the rough, but dressed down to 1¾ or 1⅞. The frame consists of an upper and lower rail, with suitable posts, also of plank, framed in so as to leave openings for ventilators and windows. It is continuous from end to end of the car, and rests upon the end plates. The upper rail is about 2¾ inches deep, and the lower one about 6 inches, as will be seen by reference to Fig. 1, which shows a cross-section through the wall of the raised roof. On the outside the short carlines are mortised into the lower rail in the usual way, as shown by the solid lines, Fig. 2, which represent the wood part of the compound carline. The iron is shown passing up on the outside. To form a finish, the inside is covered with black-walnut, ½ an inch in thickness. The form of the separate pieces of walnut is shown in Fig. 3. In order to improve the finish, pieces of curled or bird's-eye maple veneering, cut so as to resemble panels, are put upon the lower rail under each of the windows. Their form is also shown in Fig. 3, between the Grecian head and rosette, the latter being under the ventilator V and the former between the windows. Each piece of walnut on the rails is about 5 ft. 2 in. in length. The window space W is 24½ by 7½ inches in the clear. The ventilator takes up the entire panel space between the windows, the panel being made extra wide to receive it. In this instance, as represented in the cut, the width of the space is 11⅜ inches. The other panels are but 6¾ inches wide, and have the head and bracket ornament as shown, making a neat and tasteful finish. At the top the finish is completed by a black-walnut moulding 1⅝ inches wide, relieved by a quarter round gilt band at its lower edge, and by a polished black line at its outer edge. This moulding is of course cut off at the brackets, which project 2⅝ inches from the wall of the deck. At the bottom of the lower rail, a very pretty finish is made by putting on a strip of polished walnut ½ an inch in thickness and 1¼ wide, with a ¼ inch round gilt bead upon each side of it. The pendants underneath each of the carved heads, break the line of moulding just enough to produce an effect agreeable to the eye. The lower edge of the short carlines coming just flush with the bottom of the rail, saves the trouble of putting in furring, as the head-lining can be nailed directly to the rail and at the same time be very nicely covered by the finish on the bottom.

The entire thickness of such a wall is but a little more than 2 inches, and as both rails extend from end to end of the car, there is much greater strength with the same amount of material than can be obtained in any of the usual methods of framing in which the iron carlines pass up in the wall. The lower rail or plate being a piece of straight forward work, that can be almost entirely finished upon the planer and moulding machine, is much cheaper than the ordinary triangular sticks of which the lower rail is made, besides being stronger in the absence of short sections and numerous joints, and at the same time more stylish in appearance and requiring less labor in construction. The sketches for the cuts were made from cars built by the Cumming's Car-Works for the New-York and Oswego Midland Railroad; but the original patterns, somewhat improved with a view to diminished cost, came, we believe, from Wilmington, Del. When very fine work is required, raised or sunk panels can be used instead of relieving the surfaces with veneers cut to shape; and the ornamental lines on each side of the bracket, which in this case are cut from maple veneer and glued on, can be engraved and gilded in the style of fine cabinet work. The reduction in the quantity of roof material, and consequently in the weight of the structure, are points which builders will appreciate.

In this connection we illustrate in Fig. 2 the short wooden carline used by Mr. Worth, the master car-builder of the Philadelphia, Wilmington, and Baltimore road. The sketch shows the carline as it would be applied to the style of raised roof we have illustrated. While retaining the usual form upon the under side, and varying only slightly on the upper side, the carline preserves the full strength of the stick; that is to say, the grain of the wood is continuous, and is not interrupted by the bends. In most of the ordinary patterns, the grain crosses the carline more or less obliquely, so that the strength of the stick is only equal to the force or strain required to *split* the wood at that point instead of breaking it. In Fig. 2, however, the grain does not run crosswise, and the full strength is retained. With less material, a capacity of resistance is secured equal to that of heavier sticks with oblique or cross grain. In Mr. Worth's carline, made of straight grained sticks, the curves are obtained by varying the width or depth as may be needed. Thus at the foot, the width is 4¼ inches, which is the width of the stuff required for cutting out the carline, while at the upper end it is 3¼ inches.

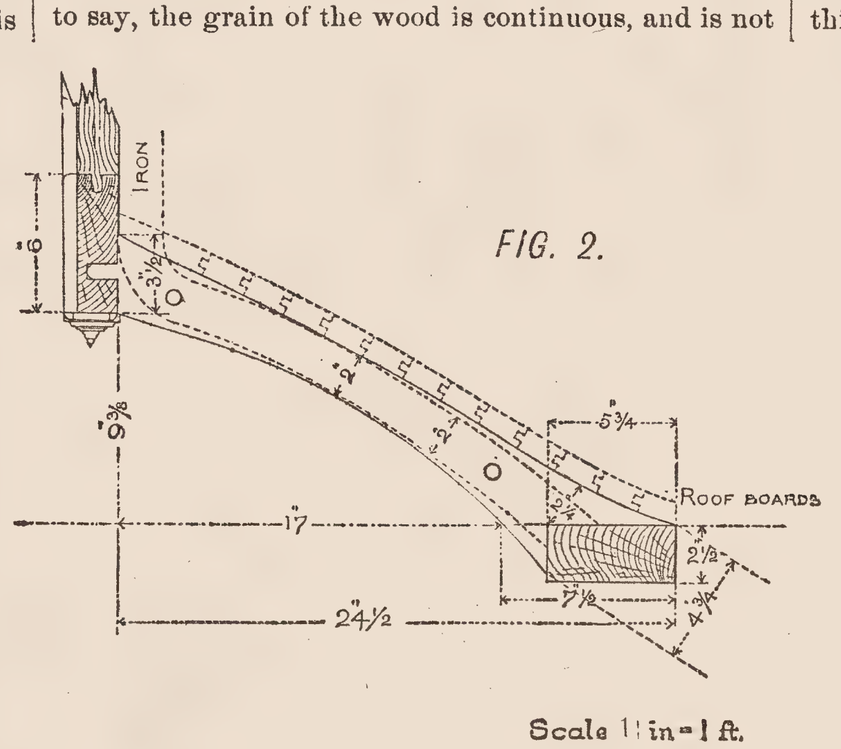


FIG. 2.

Scale 1½ in = 1 ft.

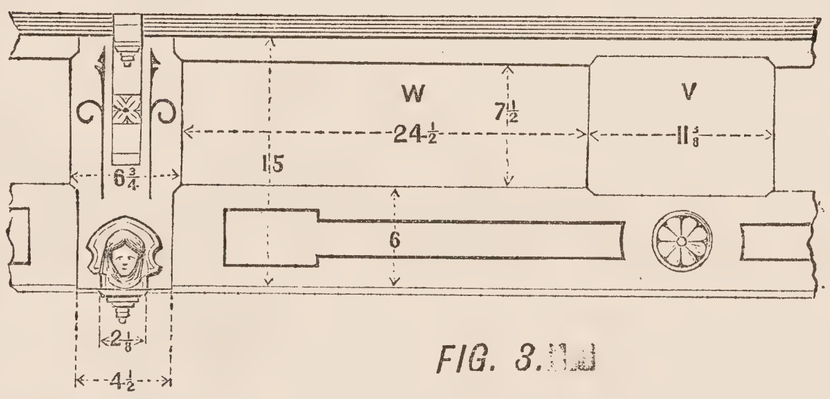


FIG. 3.

Is this Stewart's Crossing?

A SLIGHTLY deaf and somewhat fussy old lady of Macon, Georgia, who had just married her third husband, started to visit some of his relatives at Americus, a town in one of the lower counties. As these relatives were not altogether pleased with the match, she arrayed herself in the most presentable style, and in accordance with the requirements of fashion, in order to make a favorable impression. As soon as she was fairly on the train, she requested the conductor to let her know when the train reached Stewart's Crossing, which is about four miles from Americus. This the conductor, of course, promised to do. Powersville was reached, the fourth station from Macon, when she called the conductor to her and eagerly inquired if that was Stewart's Crossing. He replied that it was not, and told her to give herself no anxiety, as he would tell her when they got there—in fact, as it was not a regular station, he would give her notice before reaching it, so she could be in readiness. The train proceeded on its way, stopping at Fort Valley, Marshallville, Montezuma, Oglethorpe, and Andersonville, the old lady inquiring at every stop, and with increasing excitement and uneasiness, if that was Stewart's Crossing. The conductor's patience was sorely tried. He again and again informed her in the most positive manner that he would let her know when they got there. Shortly after leaving Andersonville, however, he got into a discussion with a gentleman on the comparative merits of broad and narrow-gauge, forgetting for the time being every thing else. Looking out of the window, he seized the bell-cord, exclaiming, "Bless my life, we've passed Stewart's at least a mile."

Stopping the train, he had the motion reversed, and ran over a mile back to Stewart's Crossing when he went to the old lady.

"Stewart's Crossing, ma'am."

"Are we there?" she asked.

"Yes, ma'am; hurry up and get off as soon as possible; we are behind time, and had to run back nearly two miles for you."

The old lady seemed wondrously calmed, and said with the greatest simplicity:

"I don't want to get off here. I want to go to Americus."

"Don't want to get off here?" thundered the conductor, "what in the thunder did you want us to stop here for?"

"I didn't want you to stop here," she meekly replied.

"What did you want to know when we got here for then?"

"Because," smilingly said the venerable girl, "my old man told me when I got to Stewart's Crossing, *it would be time to put in my teeth!*"

THE new car-works at Schenectady commenced operations in October, but owing to the prevailing depression in business, paid off their hands, about forty in number, and suspended operations for the present. The Ellis Locomotive Works, at the same place, after discharging about fifty men, received an order for twenty-eight locomotives, which will afford full work for all hands during the winter. Some twenty of these engines are already in progress.

FORTY-FOUR thousand hogs arrived in Chicago in one day, week before last.

The National Car-Builder,

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JAMES GILLET, EDITOR.

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DECEMBER, 1873.

Editorial Announcements.

CORRESPONDENCE.—*We cordially invite the coöperation of the railroad public in affording us the material for a good mechanical paper. Articles relating to rolling-stock and machinery, by those practically acquainted with those subjects, will be gratefully received. All communications must be addressed to Vose, Dinsmore & Co., No. 32 Warren Street.*

ADVERTISING RATES.—*For one square, or one fifth of a column, $5 per month, or $50 a year. For half a square, $3 per month, or $25 a year. Larger advertisements by special contract.*

All communications in regard to advertising should be addressed to L. F. DINSMORE, *Post-Office Box* 4055, *New-York City, who is our agent for advertising, and authorized to make contracts, collections, etc.*

ENGRAVINGS AND ILLUSTRATIONS.

We would invite the attention of Master Car-Builders and others to the advantages to be derived from publishing in THE NATIONAL CAR-BUILDER *engravings designed to illustrate the various features and details of car construction, and especially such improvements as can not otherwise be clearly presented. We will procure cuts to be made in the best manner from drawings or models that may be sent us, and charge only for the cost of engraving, inserting the same in our paper with suitable descriptive details, without charge.*

Close of the Fourth Volume.

THE present number of THE CAR-BUILDER completes the fourth volume. It will be noticed that there is an irregularity in numbering the volumes, reckoning twelve numbers to a volume, from the date of the first issue, in July, 1870. The first and second volumes, containing twelve numbers each, terminate in June, 1871 and 1872, respectively; and the third volume, containing but six numbers, in December, 1872. This change was made to conform to the calendar year, and also on account of the continuous paging which was introduced with the January number of this year for the convenience of indexing. Those of our readers who have preserved a file, will find the index to the fourth volume, which we publish with our present issue, very convenient for reference. Hereafter, only the reading matter, or body of the paper, will be paged continuously, so that in binding, the advertisements may be left out if preferred. Back numbers for the year 1873 may be had complete, in binding or otherwise, on application to the publishers; also most of the previous numbers.

OURS being a monthly publication, we do not think it worth while to chronicle all or any considerable portion of the current items to be found in the newspapers in regard to the stoppage or partial stoppage of locomotive and car-works and discharge of employees; for the reason that such statements are frequently exaggerated, or, if true when made, the state of things may be very much changed by the time our current issue reaches its readers. The general depression in business just now is bad enough without being magnified by the publication of hearsay reports.

MR. C. DINSMORE, of the firm of Vose, Dinsmore & Co., sailed for Europe on the 29th ult., and will be absent several months.

Report of the Railway Master-Mechanics' Association.

THE official report of the proceedings of the sixth annual meeting of this Association was published early last month. It is a well-printed volume, somewhat larger than its immediate predecessor. The contents are worthy of a careful examination by railway officers, and especially those connected with the car and locomotive departments. Such an examination can not fail to leave the impression that the association is doing much to promote the best interests of railways by systematic inquiry and investigation; and although the results may not be immediately apparent as respects this or that particular feature of railway operation, yet the tendency of what is said and done at every annual meeting is in the right direction. More reliable information is obtained, additional facts brought to light, improvements suggested, wrong impressions corrected, and perplexing questions more clearly elucidated. Every year furnishes evidence that the association is increasing in numbers and usefulness; not as rapidly, perhaps, as some over-sanguine people might desire, but still there is growth, steady and unmistakable. Such evidence is to be found in the report just published, which has two conspicuous features we are glad to notice. One is the proportionately large space occupied by the reports of committees, and the other is the numerous illustrations and tabular statements which accompany these reports. This indicates earnest work, which is the only kind that tells in the long run, and without which the annual meetings would be little more than empty formality. The discussions are rather meagre as compared with those of the previous meeting at Boston, but this may be owing to the brevity with which they are reported. If nothing more was said by the members during their business sessions at Baltimore than the reported discussions in this volume, they were rather more taciturn than such assemblages usually are. We can not but think that a full verbatim report of what is said at annual meetings would be far more advantageous than otherwise to associations of this kind. A knowledge that every word of the regular discussions would be photographed, as it were, printed in a book, and read by their cotemporaries and posterity, would be a strong inducement for members to make some special preparation for the part they are to take in them, by putting their mental machinery in the best working order. They would think more, their views would be more matured, their thoughts better arranged, and their facts so completely at their finger-ends, that whatever was said would be worthy of permanent record. The sessions being necessarily limited to the brief period of two or three days, and attended with more or less entertainment and social greeting, there is the greater need of thorough preliminary work by committees and individual members, in order that the business may be transacted in a satisfactory manner, and without the defects incident to haste and confusion. A reporter should be employed who can not only catch every word, but who is specially qualified for his work by some previous knowledge of mechanical terms and railroad nomenclature. It would also be an advantage if discussions could be kept as much as possible from running into irregular, rambling, conversational talk, as is too often the case when the members collectively, and especially the presiding officer, are unaccustomed to parliamentary rules and usages.

The present report contains a great deal of valuable information upon various subjects, including boiler incrustation, fuel, power-brakes, check-chains, snow-plows, locomotive-tires, car-axles, etc. There is an interesting paper, by W. W. Evans, on the relative cost of operating narrow and standard-gauge roads, in which conclusions are reached decidedly adverse to the former; also an elaborate paper by Reuben Wells, of the Jeffersonville, Madison, and Indianapolis Railroad, on the comparative resistance of loose and tight wheels in running on curves, giving the details of numerous experiments showing that no advantage in hauling power is to be derived from loose wheels or compound axles, and that but little advantage in this respect can be claimed for the three-foot gauge on a curve of 300 feet radius. The report of the committee on car-axles was read at the Boston Convention of Master Car-Builders, and is included in the puplished proceedings. The report on snow-plows is illustrated with drawings, and is a very full and complete presentation of the subject, setting forth the comparative merits of the various devices which have been used. There is also a lengthy and interesting report on check-chains, which will be found entire in our present issue.

Without enumerating more particularly the contents of the volume, which is doubtless by this time in the hands of many of our readers, we must congratulate the association on the evidence of growth and prosperity which is afforded by their sixth annual report. Any members who have not received it will be furnished with a copy by sending their address to J. H. Setchel, Secretary of the Association, Cincinnati, Ohio.

The Plethora of Inventions.

IN no previous age of the world has there been a period so prolific in mechanical inventions as the present. The mental energy expended in this particular field is prodigious, and should there be no abatement, it will very soon assume, if it has not already, the character of a mania. This prevailing activity has its origin, not so much in the natural aptitude of individual minds for devising mechanical appliances and labor-saving expedients, as in an eagerness to realize fortunes, or, at the least, a sufficient income for daily needs, without the toilsome drudgery incident to ordinary pursuits. Although the relative proportion of prizes and blanks is about the same as that between a kernel of wheat and a bushel of chaff, yet there is no falling off in the applications at the patent bureau. Every intelligent person is aware how very few comparatively of the great multitude of patented devices enable the inventor to realize even a net balance of nominal profit, while the instances in which any thing like a fortune is made, are still more rare. Fortunes, however, have been made, are now being made, and will probably hereafter be made by means of patented inventions, and a knowledge of this constitutes the allurement and fascination identical in character with that of the lottery scheme and the search for Captain Kidd's treasure. We have no desire to discourage inventors or disparage useful inventions. The country can never have too many of the latter, and although the field is rather more contracted than it was, there is still room for the exercise of native skill and ingenuity in achieving good results. By native skill we mean an intuitive capacity akin to genius, developed and quickened by study and observation, and which with the requisite mental training, qualifies an inventor for his work and enables him to thoroughly understand the subjects to which his inventions are intended to apply. The lack of these qualifications by would-be inventors has stuffed the Patent-Office with a mass of gimcrack mechanism in the form of models and produced no end of disappointment, demoralization, and misery. Inventors of this class are apt to think that because an idea happens to be new to them, it must necessarily be new to every body else, and that an invention is necessarily valuable and useful if a solicitor succeeds in getting a patent for it, although there may be fifty other devices already patented for accomplishing the same thing, all of them worthless or nearly so, and neither of them an infringement upon the others. If the inventive capacity has no other stimulus than mere money-making, if this is the end and the only end at which it aims, the possessor may rest assured that the marrow of the thing is not in him, and any success he may achieve will be sheer luck. An intoxicated blind man may sometimes hit the bull's eye, but not because his aim is sure or his head "level."

A very large proportion of patented inventions per-

tain directly or indirectly to railways. The resources, magnitude, and endless mechanical details of the system, with its inherent capacity for development, offer an inviting field for inventors which they have not been slow to cultivate; yet how few of these numerous inventions have been adopted and approved as answering perfectly the ends for which they were designed; and this mainly because their authors lacked the mechanical insight to perceive exactly what was required in each particular case. Many inventions are intrinsically good and meritorious, and only lack appreciation because they are premature. They propose innovations which existing prejudices will not sanction, and are consequently regarded for the time being as visionary and impracticable. The multitude of devices which are constantly pressed upon the attention of railroad managers must, in the nature of the case, include some that are really valuable; but their value is lost to the roads for the want of time to give them such a test as will establish their merits, or because the inventors lack the ability to show their advantages in a clear and satisfactory manner. Now this is not as it should be, neither is it wise policy for roads to reject all new inventions indiscriminately because the great majority of them are worthless. In order to clear the docket and select the best, it seems to us that a board of impartial experts might be organized under the auspices of all the roads, whose business it should be to decide authoritatively upon the merits of all new devices, either by actual test or otherwise, and such decision be accepted as final by all the parties concerned. This would save the time of railroad men, relieve patentees of the misery of suspense, and secure to the roads the benefit of every invention that is really worthy of being adopted.

The Situation.

APPEARANCES seem to indicate that the distrust which has paralyzed industry and shaken commercial credit for weeks past, has reached its turning-point, and that from this time forth there will be a gradual and permanent improvement in general business. The situation is at all events better understood than it was, and this fact alone will tend to restore confidence. People are beginning to discover that the currency has had less to do in precipitating the original panic than many have supposed; and that the present crisis, like previous ones, is the offspring of an extension of individual and corporate credit beyond the limitations of capital. This tendency has been universal in all branches of business. Liabilities have been incurred which could only be met by renewals in the shape of longer and larger drafts on the future, until a millstone of debt has been accumulated. There was an apparent but delusive prosperity so long as the general confidence remained unshaken. Speculative enterprise was stimulated, and a career of reckless extravagance entered upon which knew no halting-place short of crash and ruin. Railroads were constructed and equipped with no assured business to meet running expenses or interest on funded debt; houses built with borrowed money with no chance of a paying tenant; swamps and corn-fields intersected with paved and graded streets in anticipation of a rise in real estate; banks, forgetting they were public trustees, purchased deposits with a bonus of interest, and loaned the same "on call" to help "corner" stocks. And so the carnival went on until the inevitable climax was reached. The annual demand for currency at the West caused a strain which burst one or two prominent local bubbles. The die was then cast, speculation was demoralized and a panic inaugurated. Checks are handed in, all hands want to settle, and settle at once. There is an end of credit for the time being, an end of borrowing, of discounting, and of confidence. It is pretty soon discovered that under these circumstances, one evidence of debt is about as good as another, and the shortest way to square the books is to cancel the whole lot, bring them down to their intrinsic paper-rag value, and begin again. This is practically the way in which business communities like ours recover from those financial tornadoes to which we are periodically subject. No milder surgery will avail. The present crisis will pass, and business will resume a healthy activity, as it has done in former cases, just as soon as settlements begin to be made and real values substituted for those that are fictitious and delusive. This process will, of course, be gradual, and may involve perhaps additional failures; but it is the only way to restore confidence in business transactions. There will then be something to confide in. The North Pole and Patagonia Air-Line Transit Company, and the Continental Patent Mouse-Trap Manufacturing Association, with one per cent of stock paid in, and bonds "safe, permanent, and remunerative," will have to go into liquidation, as well as all other enterprises of a like character.

Although no definite time can be fixed for a complete restoration of business activity, yet it must come sooner or later, just as health follows convalescence. The abundant and unimpaired resources of the country are a sufficient guaranty of this. There has been no actual destruction of property, no failure of crops, no war, no invasion, nothing to eat out our substance or impoverish any class or section. On the contrary, we have a yield of staple products unsurpassed by that of any previous year, railroads penetrating everywhere, manufactories, machinery, and all the substantial elements of commercial prosperity. We have a currency sufficient in volume for the demands of trade, and which will be made available and perform its accustomed uses as soon as it can be drawn from its present hiding-places. It can not be profitably stored away for any length of time in safe-deposit vaults, teapots, and old stockings. It is dead capital unless it is used, and it will be used as soon as the holders are satisfied that it can be safely invested. The consumption of the numerous products of our manufacturing industry is constantly going on, and the longer this industry is partially suspended, the more is the stock of such products in the market reduced, and a future demand for them increased. Our transportation facilities also, in connection with the large and pressing demand for our agricultural products abroad, must be actively employed during the winter and coming spring. These considerations, as well as the history of previous panics, lead us to conclude that the present depression will be of short duration. The accumulated indebtedness of the last few years must be adjusted or swept away, and business will then experience a healthy revival, unfettered with liabilities which now press it down.

A New Railway Supply Catalogue.

VOSE, DINSMORE & Co. have just issued a very comprehensive price-list and descriptive catalogue of general railway supplies, embracing the numerous articles required for car-trimming and construction, also a great variety of devices, tools, and mechanical appliances indispensable in the operation of railroads and economical management of rolling-stock. The volume is neatly printed on fine tinted paper, and has a well-arranged index for convenient reference. The present ruling prices are given; but in filling orders, these prices are of course subject to current discounts and modifications corresponding with the changes of the market. The catalogue also contains much valuable information in tabular form in regard to the weight of rails, fish-plates and bolts, and the bearing capacity of springs; also numerous engravings illustrating the various kinds of car-springs manufactured by the firm, and embracing the most approved and effective springs in use. Copies will be sent by mail or otherwise to parties making application.

Mr. John C. Wyman, a gentleman well and favorably known in railway circles, has recently become associated with the firm in the capacity of general manager of the railway supply department, of which he has assumed the supervisory charge.

SEE notice of committee on standard journal-box, next page.

Car-Builders' Monthly Meeting.

THE regular monthly meeting was held at the rooms of the Association on the evening of the 20th ult. There were present Messrs. Leander Garey, F. D. Adams, C. A. Smith, D. H. Baker, W. E. Chamberlain, M. N. Forney, W. H. Paige, George Hackett, W. E. Partridge, and others.

Mr. L. Garey called the meeting to order, and announced that the subjects for discussion were the heating, lighting, and

VENTILATION OF PASSENGER-CARS.

Judge S. C. Maine, of Boston, being present, was invited by the chairman to explain the operation of a method recently invented by him for the more effectual ventilation of cars upon steam and street railways, some account of which will be found in another part of this paper. Judge Maine, in response, addressed the meeting at considerable length, and illustrated his views by a model showing the application of his device, and representing a window-section of a car side. His address was listened to with the closest attention, and especially that portion of it relating to atmospheric laws and the necessity of their observance in attempting to reach a practical solution of the problem of ventilation. He said he had made the subject his special study for the last eight years, and that the principle which formed the leading feature of his method, as applied to cars, offices, public halls, and buildings of all kinds, was an accidental discovery, made by him about four years ago. This principle consisted in the deflection of the external air admitted into any apartment for purposes of ventilation, so that, instead of being introduced horizontally or at a right angle with the side wall, it would be admitted vertically, so as to form a rising column in the direction of the ceiling. The force of the influx would, in the case of buildings or stationary apartments, depend upon the difference in the temperature inside and out; the greater the difference, the greater would be the volume admitted. The effect of this mode of introducing the air was to disturb, displace, and revolutionize all the air contained in the room; while if the current is let in horizontally, it has little or no effect on the air below the line of admission, and is pretty sure, especially in railway cars, to strike some one unpleasantly. That this is the result, he had demonstrated by coloring the air in railway cars by means of a chemical process which rendered its entire volume visible, so that the movement of the inflowing currents referred to, was as clearly seen and could be as easily traced, as the muddy water discharged by a rivulet into a clear stream. The current forced into a car through the ventilators by the speed of the train —the point of entrance being as low down as the window-sills, and the current being deflected upward toward the roof—impinges and spreads upon the head-linings, attracting to it and carrying up with it, as it rises, the contiguous air in the body of the car, the impure and vitiated portion at the top being forced out through the exhaust ventilators upon each side of the monitor roof. The fresh air thus introduced and directed toward the top, naturally and gradually, by its superior gravity, settles down in the centre of the car to the floor, and takes the place of that which is all the while being drawn up. In this way all the dead air is dislodged, lifted up, and discharged at the roof, so that the occupants do not have to breathe the same air twice. But if, on the other hand, the air from without is let in on the line of the window-sills or elsewhere, horizontally instead of vertically, it causes no such general circulation, and produces no change in the air below the line of admission. This had been clearly shown by tests with the air made visible by coloring.

The supply-ventilators might be in the form represented in the model, or their form might be varied; they might be plain or ornamental; the principle of admission by which the current is deflected vertically, and the point of its admission being as low as the window-sills, were the essential features. It was, in fact, the application of the principle of ventilation

embodied in the old-fashioned country fire-places, by which the air was drawn from every part of the room to the chimney-funnel and discharged. He would call the attention of the meeting to the fact that the ordinary exhaust and supply ventilators, located along the sides of the car-roofs, were very deceptive in conveying the idea that the car was ventilated by their working, especially when the doors and windows were closed. The little bits of paper were seen alternately blowing in and out to show that ventilation was going on, but the change in the air was confined exclusively to the top of the car, and did not reach the great volume of it below, at all. This was sufficiently proved by the foulness of the air in cars ventilated in this way, after they had run an hour or two. It was also proved by coloring the air and observing the effect. He would color the air in a car equipped with ventilators of this class and apparently in full and successful operation, and more or less of the identical air in the car at the start would be found in it after it had traveled a hundred miles, even with the usual opening of doors in the cold season. By means of the method represented in the model, the entire volume of air in a car could be changed in seven minutes, if required. He had been asked, since his arrival in the city, if such a rapid change would not in cold weather reduce the temperature in the car too much for the comfort of passengers. It probably would do so ; but the influx was under the control of the passengers, and it could be regulated so as to maintain whatever temperature was required for comfort. This would, in severe weather of course, make the ventilation somewhat less thorough. As respects the heating of cars, his views would probably differ somewhat from those of many gentlemen present. He believed that raw air was far better than cooked air, and should be used as far as practicable. If we entered a room heated by a furnace or an ordinary stove, with no extra supply of moisture, we often experienced a sudden sense of heat and then a chill. Dry air and radiated heat could no more be mixed than oil and water ; but if such air is supplied with the requisite moisture, it will take on seventy times as much heat as it will in the absence of moisture. Fresh unheated air was consequently more available for utilizing heat than dry or cooked air, and this fact accounted for the mysterious phenomenon sometimes observed, of a higher temperature being indicated by the thermometer upon the admission of cooler air into the room where the instrument is. This was very puzzling to those who had noticed it, and demonstrated the truth of the theory advanced. Air in our cars should be warmed, but not burnt by contact with red-hot stoves or baked with steam-pipes in close tanks, a process which destroyed its wholesome and life-supporting properties. With the system of ventilation proposed, cars can be heated as they now are, if we take in the air, diffuse it, spread it out, and thus produce and keep up a circulation removing and also disinfecting the vitiated portion. It was not generally known that pure air was a powerful disinfectant, as much so as any afforded by nature. Five hundred parts of air so impure as to be unfit for respiration, could be made wholesome and breathable by mixing with it one hundred parts of pure air, the noxious qualities being not only diluted but substantially destroyed by the mixture. The effluvia generated by the densely populated portions of great cities, and the accumulation of foulness and filth of closely packed tenement-houses, were neutralized to a great extent by this universal disinfectant. This fact should not be overlooked in car ventilation. The admission of pure air not only displaced and drove out a corresponding quantity of foul air, but by mixing with it, destroyed its noxious qualities. The speaker also called attention to another fact which is apt to escape notice without careful investigation, and that is, that in a car or apartment supplied with but one or more ventilators on the same horizontal line, the air passed alternately in and out of the same opening—the room *breathes*, as it were—and this was caused by the variations of temperature, expanding the volume in the room and contracting it, thus producing action and reaction. This was shown very clearly by holding a feather over the mouth of the ventilators introduced by him and now so extensively used under the lower sashes of house-windows.

Mr. C. A. Smith thought the plan of ventilation proposed by Judge Maine was a good one for the summer season or for any time except severe weather in winter. In the latter case, he thought the passengers could not be kept warm with such an influx of air from the outside ; and as regards the theory advanced that the admission of air colder than that already in the car would raise the thermometer, he would prefer to see the experiment tried before he could have faith in such an apparent contradiction. It might be so, but it seemed contrary to nature and our common experience.

Judge Maine said that if the gentleman would come to Boston, and take a ride from that city to Bangor on a car equipped with the ventilators, he would satisfy him of the fact or pay his expenses for the entire trip ; or, if any time or place could be designated for the purpose, he would undertake to do it here. He also had his chemicals here, and was prepared to make experiments showing the effect of the ordinary ventilators upon the air in a car.

Our space does not admit of a full report of Judge Maine's address. The foregoing is merely a brief synopsis, but will serve to indicate the leading points. For a more particular description of his device, we refer to the account of a recent experimental test on the Eastern Railroad, in another column.

JOURNAL-BEARINGS.

Mr. G. R. Meneely, President of the Meneely Journal-Bearing Manufacturing Company, of West-Troy, N. Y., upon the invitation of the chairman, exhibited a bearing composed of bell-metal and brass welded together, and also a specimen of one of the same kind that had been in use on the New-York Central Railroad, and which had been broken with a sledge for the purpose of showing the tenacity of the weld. His long experience as a bell-founder had convinced him that no metal wears as well under severe friction as bell-metal, and he had satisfied himself by experiments, that when it is welded to brass or other metal of like hardness, it was the most desirable combination for railway journal-bearings. With ordinary attention, they would never heat or break, and the cost in the long run, making due allowance for the value of the old or worn bearings, was much less than that of the ordinary brasses. They would also wear twice as long with the usual degree of attention.

After some further conversation, the meeting adjourned. The attendance being rather smaller than usual, the consideration of the same subjects will be resumed at the next regular meeting, Dec. 18th.

Advertising is Economy.

THERE are many business men, we dare say, who consider it an excellent stroke of economy to discontinue or greatly reduce their line of advertising during the present period of depression and dullness. There are individual cases, of course, in which retrenchment in this respect may be expedient if not unavoidable ; but, as a rule, we think there is nothing gained in a business way by such a course. Advertising has become indispensable where success depends on securing the patronage of the public. It is the only effective medium of communication between producer and consumer, vendor and customer, as every shrewd business man is aware. Advertisements, in times like these, receive even more attention than in seasons of prosperity. The manufacturer looks to them to see who is in the field, and what others are doing in his line ; and a large class of dealers consult them with a view to sales and purchases. Our advice to our patrons is to advertise. It will help *us*, to be sure, but it will help *you* more. What we counsel is what all successful business men habitually practice.

The Standard Journal-Box and Jaw.

To Railroad Superintendents, Master Car-Builders and Car-Manufacturers :

THE committee appointed by the Master Car-Builders' Association to determine upon the size and pattern of a standard journal-box and jaw, having completed the patterns and drawings for the various parts, and having selected Messrs. Townsend & Jackson, of Albany, to make all the metal patterns of the same for wooden trucks, and Mr. Daniel Doncaster, of the same place, to make those for iron trucks, would herewith inform parties desiring such patterns, that they may be obtained by addressing the undersigned, at West-Albany, N. Y., stating the road initials they may wish to have placed on them. Private car-builders can have the jaw pattern made with a recess to receive the plate containing the initials of the road. By this means the same pattern will answer for any road by simply changing the plate.

By order of the committee,

JOSEPH JONES.

MENEELY'S PATENT JOURNAL-BEARING.—This bearing may be applied to any kind of journal. There is nothing peculiar in its form, its superior qualities being attributed entirely to the materials used and the method of manufacture. It is composed of two kinds of metal so perfectly welded as virtually to constitute one piece. The outside or upper section is first made of tough bronze or brass, and the inside or wearing part, consisting of hard bronze or bell-metal, is subsequently welded to the upper by a peculiar process, thus forming a union as perfect as that obtained by the welding of steel to iron. They have been in use for eighteen months on the New-York Central and Hudson River Railroad, and with ordinary attention are not liable to heat or break. The fineness and hardness of the wearing surface make them very durable, while the cost, making due allowance for the value of the old or worn out bearings, is estimated to be forty per cent less than the common brasses in use. See advertisement, page 320.

THE DIXON PENCIL.—Every body appreciates a good lead-pencil. They are as indispensable in business as good pens, ink, or paper ; should make a clear, legible, erasable mark, without any moistening of the point ; they should be perfectly free from grit, and with small liability to crumble or break ; the points should wear well, the leads of each grade should be uniform in quality and the grades reliable. Pencils with all these requisites, aside from a beautiful finish, are manufactured by The Joseph Dixon Crucible Co., of Jersey City, N. J. They are really what the makers claim for them, and being a product of home industry, should be encouraged. Whoever tries them will always know where to get good pencils.

ALLEN'S CENTRE-BEARING SWING-BEAM TRUCK.—We are promised a full description and illustration of this truck for our next number. Its construction is such as to greatly increase the efficiency of motive power, does not spread the track in passing curves, saves the wheel-flanges and prevents skidding. A train equipped with it will start with greater ease, and a larger number of cars can be drawn with the same power. See advertisement, page 319.

TODD'S PATENT COUPLING FOR FREIGHT-CARS.—We have as yet had no opportunity of inspecting this device ; but if its merits are not exaggerated—and we have no reason to suppose they are—by the numerous and flattering testimonials of those who have tried it. it is worthy of being adopted upon all roads, as a sure, safe, practical, and life-saving invention. We refer at present to advertisement on page 293, but hope to be able to describe and illustrate it more fully in a future issue.

THE Wason Car Company, at Springfield, Mass., are building 100 cars for the transportation of beef from Texas to New-York.

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Facetiæ.

AN old bachelor said, "There's a great deal more jewelry worn nowadays than when I was young; but there's one piece that I always admired which I don't often see now." "What is that?" asked a young lady. "A thimble," was the reply. He was regarded with contempt and scorn by every lady in the room for the rest of the evening.

A YOUTH who was taking an airing in the country tried to amuse himself by quizzing an old farmer about his bald head, but was extinguished by the old man, who solemnly remarked, "Young man, when my head gets as soft as yours, I can raise hair to sell."

"DO bats ever fly in the daytime?" asked a teacher of his class in natural history. "Yes, sir," said the boys, confidently. "What kind of bats?" exclaimed the astonished teacher. "Brick bats," yelled the triumphant boys.

"WHAT time is it, my dear?" asked a wife of her husband, whom she suspected of being slightly "elevated," but who was doing his best to look sober. "Well, my darling, I can't tell, 'cause, you see, there are two hands on my watch, and each points to a different figure, and I don't know which to believe."

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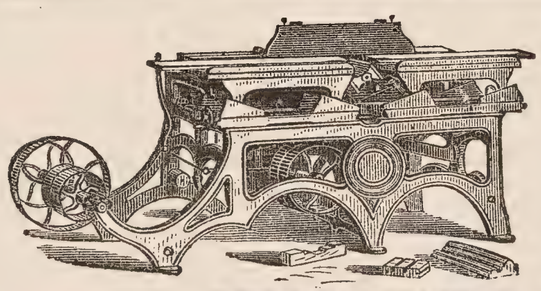

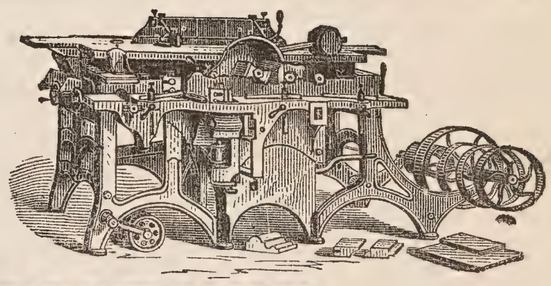

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Boston, Concord & Montreal	Ralph Adams	M. R. Elkins	Lake Village, N. H.
Boston & Maine	F. A. Waitt		Boston, Mass.
Boston & Maine		D. C. Richardson	Lawrence, Mass.
Boston, Lowell & Nashua	J. F. Crockett	T. G. Davis	Boston, Mass.
Boston, Lowell & Nashua		S. A. Davis	Nashua, N. H.
Blossburg & Corning	O. C. Patchell	O. C. Patchell	Corning, N. Y.
Brockville & Ottawa	H. J. Marshall	H. J. Marshall	Brockville, Can.
Blue Ridge			Anderson. S. C.
Burlington & Missouri River	J. Christiansen		Plattsmouth, Neb.
Burlington, Cedar Rapids & Minn	R. W. Bushnell	R. W. Bushnell	Cedar Rapids, Iowa.
Buffalo, New-York & Phila	Allen Vail		Buffalo, N. Y.
Buffalo, Corry & Pittsburg	H. J. Bookhammer	Jacob Williams	Oil City, Pa.
C			
Cairo & Fulton	L. Finlay	L. Finlay	Little Rock, Ark.
California Pacific	A. J. Stevens	D. Rutherford	Vallejo, Cal
Camden & Amboy	F. B. Stevens		Hoboken.
	T. T. Kerr	E. Lockwood	Bordentown, N. J.
	Thomas Single		South-Amboy.
Camden & Atlantic	Rufus Hill	S. Wills	Camden, N. J.
Canada Southern	C. E. Benton	C. E. Benton	St.Thomas, Canada.
Carolina Central	W. A. Gill	Thos Myers	Laurinburg, N. C.
Catawissa	A. J. Prescott	C. D. Ellis	Catawissa, Pa
Catasauqua & Fogelsville	Thomas Evans	Chas. J. Holbach	Catasauqua, Pa.
Carrolton & Oneida	M. T. Wiggins		Carrolton, Ohio.
Charleston & Savannah	H. T. Calder		Charleston, S. C.
Chesapeake & Ohio	W. G. Freeman	J. N. King	Richmond, Va.
Chesapeake & Ohio	§T. J. Hamer	H. C. Bossinger	Huntingdon, W.Va.
Cheraw & Darlington	D. W. Haines	A. M. Corrie	Florence, S. C.
Champlain Trans. Co.	H. T. Calder		Burlington, Vt.
Cheshire & Ashuelot	F. A. Perry	F. A. Perry	Keene, N. H.
Charlotte, Columbia & Augusta	Robert King	J. Q. Seats	Columbia, S. C.
Chicago & Lake Huron			
Eastern Division	E. Hollis		Port Huron, Mich.
Western Division	W. C. Faulkner		Battle Creek, Mich.
Chicago & North-western	§Geo. W. Tilton	Thomas Hull	Chicago, Ill.
Wiscon. Mad. & Mill. Divis		Henry Hull	Fond du Lac, Wis.
Galena Division	D. Manning	Hugh Gray	Chicago, Ill.
Wiscon. Mad. & Mill. Divis	T. B. Tilton		Chicago, Ill.
Iowa Division	C. C. Elliott	William Campbell	Clinton, Iowa.
Peninsula Division			Escanaba, Mich.
Chicago & Alton	John A. Jackman	R. Reniff	Bloomington, Ill.
Chicago, Burlington & Quincy	‡Geo. Chalender		Burlington, Iowa.
Eastern & Middle Division	E. T. Prindle	W. W. Wilcox	Aurora, Ill.
Galesburg Division	Wm. Wilson	J. D. Besler	Galesburg, Ill.
Quincy Division	Joel West.		Cresson, Iowa.
Burlington Division	S. E. Burtch		Burlington, Iowa.
Buda Division	P. R. Sutton		Buda, Ill.
Chicago, Clinton & Dubuque	P. R. Sutton		Dubuque, Iowa.
Chicago, Dubuque & Minnesota	P. R. Sutton		Dubuque, Iowa.
Chicago, Rock Island & Pacific	T. B. Twombly	B. K. Verbryck	Chicago, Ill.
Chicago & Michigan Lake Shore	Wm. L. Fitch.	Oliver Udell	St. Joseph, Mich.
Chicago, Danville & Vincennes	A. B. Bedell	W. H. Dunham,	Danville, Ill.
Chicago, Danville & Vincennes	J. M. Sanborn		Chicago, Ill.
Chicago & Canada Southern	§§J. Johann		Trenton, Mich.
Cincinnati, Wabash & Michigan	E. M. Porter		Wabash, Ind.
Cleveland, Col., Cin., & Indianapolis	‡L. S. Young	††William F. Smith	Cleveland, Ohio.
Indianapolis Division	L. W. Durgin		Galion, Ohio.
Indianapolis Division		R. Attridge	Indianapolis, Ind.
Cincinnati Divison	D. Carmichael	D. Carmichael	Delaware, Ohio.
Columbus Division	F. G. Kaufholz	Wm. Cleve	Cleveland, Ohio.
Cleveland and Pittsburg	N. E. Chapman	A. Steinbrunner	Cleveland, Ohio.
Cleveland, Mt Vernon & Delaware	J. W. Holloway	J. W. Holloway	Akron, Ohio.
Cincinnati, Hamilton & Dayton	William Cullen	W. H. H. Allison	Cincinnati, Ohio.
Cincinnati & Indianapolis Junction	W. McKinzie	Edwin Beeny	Indianapolis, Ind.
Cincinnati, Lafayette & Chicago	Charles E. Gore		Lafayette, Ind.
Cincinnati & Muskingum Valley	Leroy Kells	Daniel Jewell	Lancaster, Ohio.
Cincinnati, Sandusky & Cleveland	John Y. Beattie	John Y. Beattie	Sandusky, Ohio.
Cobourg, Peterboro & Marmosa	Wm. Polson		Cobourg, Canada.
Columbus, Chicago & Indiana Central	(See Pitts. Cinn. & St. Louis)		
Concord	Chs. L. Eastman	M. W. Dickerman	Concord, N. H.
Concord & Portsmouth	C. L. Eastman	M.W. Dickerman	Concord, N. H.
Concord & Claremont	J. N. Lander	A. Langmaid	Concord, N. H.
Connecticut River	§Wm. H. Stearns		Springfield, Mass.
Connecticut Valley	C. W. Hollister	N. A. Smith	Hartford, Ct.
Connecticut Western	N. Slingland		Hartford, Ct.
Contoocook River			Concord, N. H.
Conn. & Passumpsic Rivers	Horace Alden	Horace Alden	Lyndon, Vt.
Cumberland Valley	A. S. Hull	C. W. Nitterhouse	Chambersburg, Pa.
Cumberland & Pennsylvania	W. L. Jordan	J. W. Sauerbach	Mt. Savage, Md.
Central of Georgia	D. D. Arden	C. C. Millar	Savannah, Ga
Central of New-Jersey	*T. W. Peeples	George Hackett	Elizabethport, N. J.
Lehigh & Susquehanna Div	L. C. Brastow	L. C. Brastow	Wilkesbarre, Pa.
Central Branch Union Pacific	Wm D. Rowley.		Atchison, Kansas.
Central R. R. of Iowa	F. B. Woodruff	T. L. Seevers	Marshall, Iowa
Central Pacific	A. J. Stevens	Benjamin Welch	Sacramento, Cal.
D			
Dakota & Southern	Jas. Whitney	A. A. Meckling	Sioux City, Iowa.
Davenport & St. Paul's	James Russell		Peoria, Ill
Dayton & Union	A. J. Keenan	J. F. Feicht	Dayton, Ohio.
Danbury & Norwalk	Charles A. Craig	C. A. Craig	Danbury, Ct.
Dayton & Michigan	William Cullen	W. H. H. Allison	Cincinnati, Ohio.
Denver & Rio Grande	John Greenwood		Denver, Col.
Delaware, Lackawanna & Western	Walter Dawson	Robert McKenna	Scranton Pa.
Morris & Essex Division	W. H. Lewis	L S. Barber	Hoboken, N. J.
Des Moines Valley	James Lamb	R. E. Smith	Keokuk, Iowa
Detroit, Ft. Wayne & Logansport	W. A. Carpenter		Bankers, Mich.
Detroit & Milwaukee	Andrew Wilson		Detroit, Mich.
Detroit, Lansing & Lake Michigan	Tho. G. Roberts		Detroit, Mich.
Delaware & Hudson Canal Co.	James Dickson	Thomas Orchard	Carbondale, Pa.
Rensselaer & Saratoga Div	John Dikeman		Troy, N. Y.
Dorchester & Delaware			Cambridge, Md.
Dubuque South-western	J. M. Smith	J. M. Smith	Farley. Iowa.
Dutchess & Columbia	W. G. Vanbuskirk	H. A. Webster	Fishkill, N. Y.
Dunkirk, Allegheny Val. & Pittsburg	J. C. Haggett	J. C. Haggett	Dunkirk, N. Y.
E			
Eastern		J. P. Somerby	Salem, Mass.
Eastern	John Thompson		East-Boston, Mass.
Eastern Kentucky	D. L. Weaver	D. L. Weaver	Riverton, Ky.
East-Tennessee & Virginia	Eli Hixon	Jos. Armbruster	Knoxville, Tenn
East-Tennessee & Georgia	Eli Hixon		Knoxville, Tenn.
East Pennsylvania		Samuel Reeves	Reading, Pa
Elizabethtown and Paducah	W. D. Robb	T. A. Cordrey	Elizabethtown, Ky.
Erie Railway	§§Howard Fry		Susquehanna, Pa.
Erie Railway	‖Robert Wallace		Susquehanna, Pa.
Erie Railway	‖V. Blackburn		Jersey City. N. J.
Erie Railway	‖J. G. Hubbard	M. Wilder	Buffalo, N. Y.
Erie Railway	W. E. Cooper	W. E. Cooper	Hornellsville, N. Y
Erie Railway		Wm. Moffet	Elmira, N. Y.
Erie Railway	‖‖David Holtz		Jersey City, N. J.
Evansville & Crawfordsville	John L. White	Joseph Stiker	Evansville, Ind.
Evansville, Henderson & Nashville	H. M. Smith	W. H. H. Price	Henderson, Ky
European & North Am. (of Maine)	A. O. Bailey	J. H. Brown	Oldtown, Maine.
Erie & Pittsburg	G. J. Parkin	G. J. Parkin	Erie, Pa.
Evansville, Terre Haute & Chicago			Terre Haute, Ind.
F			
Flushing & North Side	Wm. La Suer		College Point, L. I.
Florida	Ezra Gray	G. Hernandez	Fernandina, Fla.
Flint & Pere Marquette	Sanford Keeler	Sanford Keeler	East-Saginaw, Mich.
Fitchburg	Geo. A. Cooledge	Enos Varney	Charlestown, Mass.
Fitchburg & Worcester	John Webster	Samuel Stevens	Fitchburg, Mass.
G			
Galveston, Harrisburg & San Antonio	Jno. G. Coulon		Galveston, Texas.
Gilman, Clinton & Springfield	W. B. McKenna		Springfield, Ill.
Grand Tower & Carbondale	Hugh Smith	Hugh Smith	Grand Tower, Ill.
Grand Trunk		Warren Noyes	Gorham, Me.
Grand Trunk	†Richard Eaton	J. W. W. McWood	Montreal, Canada.
Grand Trunk			Sherbrooke, Can.
Grand Trunk		B. J. Mitchell	Portland, Me.
Galveston, Houston & Henderson	Sol. Bills.	Wm. Macbeth	Galveston, Texas.
Grand Rapids & Indiana	J. M. Boon		Fort Wayne, Ind.
Great Western of Canada	†Wm. A. Robinson	F. Childs	Hamilton, Canada.
Georgia	William Hardman	T. M. Preval	Augusta, Ga.
Green Bay & Lake Pepin	J. H. Erwin		Green Bay, Wis.
Greenville & Columbia	J. T. Price	J. T. Price	Helena, S. C.
H			
Harlem Extension	George W. Blanchard		Rutland. Vt.
Harlem Extension		C. S. Clapp	Bennington, Vt.
Hanover Branch	John J. Bingley	Henry Britcher	Hanover. Pa.
Hannibal & St. Joseph	L. W. Towne		Hannibal, Mo.
Hartford, Providence & Fishkill	Edwin Garfield	V. D. Perry	Hartford, Ct.
Hackensack & New-York	Abra'm Angausen		Hackensack, N. J
Housatonic	C. R. Morris	J. J. Ferris	Bridgeport, Ct.
Houston & Texas Central	§W. H. Purdy	W. H. Purdy	Houston, Texas.
Houghton & Ontonagon			L'Anse, Mich.
Houston Tap & Brazoria	T. J. Shellhorn	T. J. Shellhorn	Houston, Texas.
Huntington & Broad-Top Mountain	J. Salisbury	M. Tellerhoof	Saxton, Pa
Hempfield	T. Marsh		Wheeling, Va.
I			
Indianapolis, Cincinnati & Lafayette	J. S. Patterson	S. Griffith	Cincinnati, Ohio.
Indianapolis, Peru & Chicago	John McKenna	John McKenna	Peru, Ind.
Illinois Central	**S. J. Hayes	H. O. Wadlie	Chicago, Ill.
Chicago Division	Henry Schlacks		Chicago, Ill.
South Division	David Oxley		Centralia, Ill.
North Division	J. B. Edams		Amboy, Ill.
Iowa Division	Thomas W. Place		Waterloo, Iowa.
Iowa & Missouri State Line			Farmington,Iowa.
Iron	Perry Scott	Clem. Roetling	Ironton, Ohio.
Indianapolis & St. Louis	A. T. Sanford	R. B. More	Mattoon, Ill.
Indianapolis, Bloomington & Western	Tho. V. Losee	A. J. Allen	Urbana, Ill.
Ionia & Lansing	H. Loughlin		Lansing, Mich.
Indianapolis & Vincennes	A. E. Allcott		Indianapolis, Ia.
International & Great Northern	A. H. DeClercq	F. M. Looney	Houston, Texas.
Intercolonial	Wm. Whitney	Edw. Shaffer	Moncton, N. B.
Ithaca & Athens	F. A. Brown		Ithaca, N. Y.
J			
Jeffersonville, Madison & Indiana	Reuben Wells		Jeffersonville, Ind.
Junction & Breakwater	J. A. Maguire		Lewes, Del.
K			
Kansas Central	John Davis		Leavenworth, Kan.
Knox & Lincoln	§§E. R. Hamlin	Benj. Soule	Bath, Maine.
Kentucky Central	J. R. Ledyard	J. L. Hackathorn	Covington, Ky.
Knoxville & Charleston			Knoxville, Tenn.
Kansas Pacific	**L. H. Waugh		Wyandotte, Kansas.
Denver Pacific Div	**L. H. Waugh		Wyandotte, Kansas.
Denver & Boulder Valley Div	**L. H. Waugh		Wyandotte, Kansas.
Junction City & Ft. Kearney Div	**L. H. Waugh		Wyandotte, Kansas.
Arkansas Valley Div	**L. H. Waugh.		Wyandotte, Kansas.
Kalamazoo, Allegan & Grand Rapids			Kalamazoo, Mich.
Kansas City, St. Joseph & Council Bluff	§§H. L. Cooper	H. L. Cooper	St. Joseph, Mo.
King's Mountain	E. Thomas.	E. Thomas	Chester, S. C.
L			
Lake Erie & Louisville	John Pero		Fremont, Ohio.
Lackawanna & Bloomsburg	Chas. Graham	Chas. Graham	Kingston, Pa.
Lehigh Valley	John I. Kinsey		South-Easton, Pa.
Lehigh Valley	P. Hofecker	E. R. Brown	Weatherly, Pa.
Lehigh Valley	A. Mitchell	Mauch Chunk, Pa.	Delano, Pa.
Lehigh Valley	D. Clark		Hazleton, Pa.
Leavenworth, Lawrence & Gal	S. M. Philbrick		Lawrence, Kansas.
Lexington & Big Sandy	Fred. Weber	R. Brainard	Ashland, Ky.
Little Rock & Fort Smith	D. R. Wing	D. R. Wing	Argenta, Ark.
Little Miami	J. H. Setchel.		Cincinnati, Ohio.
London & Port Stanley			London, C. W.
Louisville, New-Albany & Chicago	Geo. Ruhlandt	Geo. Helfrich	New-Albany, Ind.
Long Island	Chs. A. Thompson.	Ellis Dodge	Hunter's Point, L.I.
Louisville, Cincinnati & Lexington	E. B. Gibbs	S. S. Pilson	Louisville, Ky.

Railroad.	Master-Mechanic.	Master Car-Builder.	Residence.
Louisville & Nashville	†Thatcher Perkins		Louisville, Ky.
Louisville & Nashville	D. P. Rennie	Isaac M. Owens	Louisville, Ky.
Louisville & Nashville	Jas. Montgomery		Bowling Green, Ky.
Nashville & Decatur Division	John Skidmore		Nashville, Tenn.
South & North Ala. Div.	Thos Jeffers	W. L. Gude	Birmingham, Ala.
South & North Ala. Div	C. H. Beale		Montgomery, Ala.
Memphis & Ohio Div.	Thos. Walsh	R. M. C. Parker	Memphis, Tenn.
Lake Shore & Michigan Southern	‡James Sedgley	††John Kirby	Cleveland, Ohio.
Michigan Southern Division	Geo. W. Stevens		Elkhart, Ind.
" " "		S. S. Knapp.	Adrian, Mich.
Toledo Division	Geo. H. Tier	Frank O. Bray	Norwalk. Ohio.
Erie Division	L. O. Gassett	J. Withyecombe.	Cleveland Ohio.
Buffalo Division	W. L. Wallace	A. C. Robson	Buffalo, N. Y.
Lake Shore & Tuscarawas Valley	Charles Fellows	J. D. McIlwain	Black River. Ohio.
Lake Ontario Shore	J. C. Schermerhorn	J. C. Schermerhorn	Oswego, N. Y.
M			
Marquette, Houghton & Ontonagon	A. P. Burroughs	H. D. Lyons	Marquette, Mich.
Macon & Augusta			Macon, Ga.
Maine Central	J. W. Philbrick	J. W. Philbrick	Waterville, Me
Androscoggin Div	Ira K. Russell		Farmington, Me.
Portland & Kennebec Div	John Ellis	C. H. Kenison	Augusta, Me.
Maine Central Division	John F. Merrill.		Waterville Me.
Macon & Western	D. M. Gogul	James A. Knight	Macon, Ga
Manchester & Lawrence	Chas. L. Eastman.	M. W. Dickerman.	Concord, N. H.
Marietta & Pittsburg	W. J. Adams		Marietta, Ohio.
Maryland & Delaware	J. L. Caldwell		Easton, Md.
Macon & Brunswick	M. Thornton	M. Thornton	Macon, Ga.
Marietta & Cincinnati	E. Bosley	E. Bosley	Chillicothe, Ohio.
Memphis & Little Rock	Tho. Rennells	P. Twitchell	Argenta, Ark.
Memphis & Charleston	A. Ross	A W. Drew	Memphis, Tenn.
Memphis & Charleston	H. N. Burford	Fabien Varin	Huntsville, Ala.
Mineral Point	Robert Hay	Robert Hay	Mineral Point, Wis.
Mississippi & Tennessee	Geo. Haszinger	J. Riny	Memphis, Tenn.
Mississippi Central	Henry Gibbon	John E. Becton	Water Valley. Miss
Maryland & Delaware	Samuel Peters		Greensboro, Md.
Mississippi, Gains. & Tus			Gainsville, Ala.
Midland Pacific			Nebraska City, Neb.
Milwaukee & Northern		W. J. F. Liddell	De Pere. Wis.
Milwaukee & St. Paul	T. S. Davis	Wm. E. Kittredge.	Milwaukee, Wis.
Milwaukee & St Paul		John Baillie	Milwaukee, Wis.
Milwaukee & St. Paul	J. Pattee	D. F. Wilson	Minneapolis, Minn.
Hastings & Dakota Division	C. C. Clements		Hastings, Minn.
Michigan Central	‡A. P. Farrar		Jackson, Mich.
Michigan Central		J. B. Sutherland	Detroit, Mich.
Grand River Valley Division		James Potts	Jackson, Mich.
J'kson, Lans'g & Saginaw Div	Andrew Wilson	Andrew Wilson	Jackson Mich.
Montgomery & West-Point	J. McVey	J. T. Daniels	Montgomery, Ala.
Montgomery & Eufaula	I. W. Hewlet	T. J. Burton	Montgomery, Ala.
Mobile & Montgomery	James McFarland.	L. Barham	Montgomery, Ala.
Mobile & Girard	C. D. Wall		Girard, Ala.
Mobile & Ohio	L. J. Fleming	John McHugh	Mobile, Ala.
	B. S. Skates	Jacob Huy	Whistler, Ala.
Morgan's Louisiana & Texas	N. Tilton	Wm. O'Brien	Algiers, La.
Missouri River. Fort Scott & Gulf	John S. McCrum		Kansas City, Mo.
Missouri River, Fort Scott & Gulf		Josiah Stahl	Wyandotte. Kan.
Missouri, Kansas & Texas		J. Townsend	Sedalia, Mo.
Missouri, Iowa & Nebraska	Wm. Adams		Alexandria, Mo.
Missouri Pacific		E. Martin	St. Louis, Mo.
N			
Nashville & Chattanooga	John U. Eastman.	J. G. Sawyer	Nashville, Tenn.
New-Bedford & Taunton	Robert Chase	Robert Chase	New-Bedford, Mass.
New-Canaan			New-Canaan, Ct.
New-Brunswick & Canada	Tho. Armstrong.	G. Houlton	Fredericton, N. B.
New-Haven & Northampton	Henry Fox.	Henry Fox.	New-Haven, Ct.
New-York, Kingston & Syracuse	A. Q. Mackenbush	G. Dikeman	Syracuse, N. Y.
New-York & Harlem	Wm. M. Strong	C. E. Garey	New-York.
New-York Central & Hudson River		††Leander Garey.	New-York.
New-York Central Division	‡G. B. Van Vorst.	††Joseph Jones	West-Albany, N. Y.
New-York Central Division	Henry Watkeys.		Syracuse, N. Y.
New-York Central Division	Amos Gould	James Leary.	Rochester, N. Y.
New-York Central Division	Jas. Butman	Wm. Johnson	Buffalo, N. Y.
New-York Central Division	S. L. White	George Rowe	Niagara Falls, N. Y.
Hudson River Division	‡Wm. Buchanan.	John McKenna.	New-York City.
Hudson River Division	R. Greenalch	J. J. Conaghty	E. Albany. N. Y.
New-York, Boston & Montreal		H. A. Webster	Dutchess Junc., N.Y.
New-York & Oswego Midland	‖Wm. H. Griggs.	Wm. H. Griggs	Oswego, N. Y.
Eastern Division	J. F. Sechler	J. A. Read	Middletown, N. Y.
Middle Division	C. E. Scruton		Norwich, N. Y.
Northern Division	Edward Van Vleck.	T. D. Day	Oswego, N. Y.
New-York & New-England	Geo. E. Boyden	Elias E. Pratt	Boston, Mass.
New-York, Providence & Boston	Jas. H. Anderson.	Jas. H. Anderson.	Providence, R. I.
New-York, New-Haven & Hartford	§§H. Kittendorf	James Denver	New-Haven, Ct.
New-York, New-Haven & Hartford	J. O. Chapman	F. Leppens	Hartford, Ct.
New-Jersey Southern	Rufus Blodgett.		Manchester, N. J.
New-Haven & Derby			New-Haven, Ct.
New-Lisbon			Leetonia, Ohio.
New-Orleans & Ohio	John R. Jordan.	John R. Jordan	Paducah, Ky.
New-Orleans, Jackson & Gt. Northern	N. Greener	N. Greener	New-Orleans, La.
New-Haven, Hartford & Springfield			Hartford, Ct.
Naugatuck	Henry Hanford	George. W. Gray.	Bridgeport, Ct.
North-Carolina	Rufus D. Wade	B. G. Sergeant	Co. Shops, N. C.
North-Louisiana & Texas	C. H. Tull		Monroe, La.
New-Orleans, Mobile & Texas	J. R. White	D. C. Roland	Mobile, Ala.
Northern Central	C. M. Lewis		Baltimore, Md.
Northern Central		G. W. Demarest.	York, Pa.
North-Lebanon		Henry B. Oves	Lebanon, Pa.
North-Pennsylvania	Franklin Roop.	Franklin Roop	Philadelphia, Pa.
North-Eastern	D. W. Haines	A. M. Corrie	Florence, S. C.
Northern	James W. Lander.	Albert Langmaid.	Concord, N. H.
Northern of New-Jersey	T. W. Demorest		New-York.
Norwich & Worcester	Richard Colburn.	G. R. Bentley	Norwich, Ct.
Northern of Canada	P. Clark.	P. Clark	Toronto, Can.
Northern Pacific	H. A. Towne		St. Paul, Minn.
Minnesota Division		W. S. Heathcote.	Brainerd, Minn.
Lake Superior & Miss. Division	W. McFarland	John Hill	St. Paul, Minn.
Dakota Division	C. W. Rossiter		Fargo, D. T.
Pacific Division	J. F. Curtis		Kalama, W. T.
O			
Old Colony & Newport	J. K. Taylor	A. Gleason	Boston, Mass.
Oil City & Pithole	George Thompson		Pithole, Pa.
Oil Creek & Alleghany River	H.J.Bookhammer.	Jacob Williams	Oil City, Pa.
Oil Creek & Alleghany	H.J.Bookhammer.	John Monks	Oil City, Pa
Ohio & Mississippi		G.Hibbard	Cochran, Ind.
East Division	A. Thompson		Cochran, Ind.
West Division	H. Elliott	Chas. Hyatt	East St. Louis, Ill.
Oregon & California	§§J. Brandt.		Portland, Oregon.
Owensburg & Russellville	J. R. Osborne		Owensburg, Ky.
P			
Paducah & Memphis	J. D. Linning		Paducah, Ky.
Painesville & Youngstown	G. R. Crane		Painesville, Ohio.
Paris & Decatur	John G. Clifford	G. Clifford	Paris, Ill.
Panama	Chas. E. Stewart.	J. G. Wilson	Aspinwall, N. G.
Pacific of Missouri	§§John Hewitt	John Hewitt	St Louis, Mo.
Pennsylvania	§§F. Thomson		Altoona, Pa.
Pennsylvania	H. D. Garrett	I. W. Van Houten.	W. Philadelphia, Pa.
Pennsylvania	E. L. Caum	Samuel W. Myers.	Harrisburg, Pa.
Pennsylvania	G. W. Strattan	John P. Levan	Altoona, Pa.
Pennsylvania	D. O. Shaver.	R. S. Ramsey	Pittsburg, Pa.
New-Jersey Division	John Headden	David H. Baker.	Jersey City, N. J.
West-Penn. Division	C. B. Street	James F. Elder	Blairsville, Pa.
Philadelphia, Wilmington & Baltimore	S. A. Hodgman.	Wm. T. Worth	Wilmington, Del.

Railroad.	Master-Mechanic.	Mas'er Car-Builder.	Residence.
Philadelphia & Baltimore Central	S. D. Danfield.	Samuel D. Danfield.	Chester, Pa.
Philadelphia and Erie	Martin Walls		Sunbury, Pa.
	W. L. Forster		Renovo, Pa.
	W. L. Holman		Kane, Pa.
	W. T. Smith.		Erie, Pa.
	§§T. N. Ely		Erie, Pa.
Philadelphia & Reading	L. B. Paxson	Aaron Steinbach.	Reading, Pa.
Germantown & Norris'n Div.	Jackson Richards		Philadelphia, Pa.
Pittsburgh, Cincinnati & St. Louis			
Pittsburgh & Columbus Division	E. Pierce		Dennison, Ohio.
Pittsburgh & Columbus Division		James McGee	Steubenville, Ohio.
Little Miami Division		M. P. Ford	Columbus, Ohio
Little Miami Division	J. H. Setchel		Pendleton, Ohio.
Col., Cin. & Ind. Division	Robert Curtis	Tho. Chamberlain	Columbus, Ohio.
Col., Cin. & Ind. Division	Geo. H. Prescott	Geo. H. Prescott	Logansport, Ind.
Peoria & Rock Island	Geo. Gregg		Peoria, Ill.
Pittsburg & Connellsville	J. E. Sampsel	J. M. Leech	Pittsburg, Pa.
Pittsburg, Fort Wayne & Chicago	S. M. Cummings	John Marquis	Allegheny, Pa.
Pittsburg, Fort Wayne & Chicago	J. M. Boon.	Israel Lee	Fort Wayne, Ind.
Pittsburg, Fort Wayne & Chicago		J. J. Kirkland	Crestline, Ohio.
Pittsburg, Washington & Baltimore	A. S. Kinsey		Pittsburg, Pa.
Peoria, Pekin & Jacksonville	R. F. Hurd	Jas. J. Doyl	Pekin, Ill.
Portland & Rochester	John G. Brady	John G. Brady	Portland, Me.
Portland & Oxford Central	Geo. W. Battles	Geo. W. Battles	Buckfield, Me.
Portland, Saco & Portsmouth	John Donnell		Portland, Me.
Port Royal	C. W. Furber	E. Hubard	Port Royal, S. C
Port Hope, Lindsay & Beaverton	H. G. Taylor	H. G. Taylor	Port Hope, Can.
Providence, Warren & Bristol	Rufus Smith	J. Brightman	Bristol, R. I.
Portsmouth, Gt. Falls & Monmouth	James Tucker	E. Fall	Union Village N H.
Petersburg & Weldon	R. B. Andrews	Alex. Wright	Petersburg, Va.
Providence & Worcester	Joseph Kelly	Olney L. Smith	Providence, R. I.
Poughkeepsie & Eastern	John L. Driscoll	Jerry Wigg	Poughkeepsie, N. Y.
Q			
Quincy, Missouri & Pacific	Geo. Adams		Quincy, Ill.
R			
Raleigh & Gaston	J. B. Gayle	J. B. Gayle	Raleigh, N. C.
Richmond, Fredericksburg & Potomac	H. Kuhn	W. H. Trainham	Richmond, Va.
Richmond, Danville & Piedmont	John McFarland	H, Longest	Richmond, Va.
Richmond & Petersburg	John O'Brien	H. L. Carter	Richmond, Va.
Richmond & York River	C. H. Harris	J. L. Thompson	Richmond, Va.
Rive De Loup	P. A. Logan	C. R. McKinnin	Fredericton, N. B.
Rome, Watertown & Ogdensburg	Abram Klohs	H. H. Sessions	Rome, N. Y.
Reading & Columbia	B. Van Lew		Columbia, Pa.
Rome, Georgia	O. W. Harbin	O. W. Harbin	Rome, Ga.
Rochester & Genesee Valley	M. E. Brown	M. Wilder	Buffalo, N. Y.
Rockford, Rock Island & St. Louis	Joseph Elder	T. F. Nolte	Beardstown, Ill.
S			
Saginaw Valley & St. Louis	W. S. Thompson		Saginaw, Mich.
Selma, Marion & Memphis	R. H. Anderson		Marion, Ala.
Southern Pacific of California	J. P. Wilson	F. N. Bellisle	San Francisco, Cal.
St. Croix & Lake Superior			New-York City.
St. Croix & Penobscot	Edward Bolton	A G. Page	Milltown, Me.
St. Lawrence & Ottawa	Calvin Dame.	Calvin Dame.	Prescott, Canada.
St. Louis & Iron Mountain	O. A. Haynes	Oscar Doolittle	Carondelet, Mo.
St. Joseph & Denver City	E. Sleppy		St. Joseph, Mo.
San Antonio & Mexican Gulf	W. T. Bingham		Victoria, Texas.
South Side of Long Island	Geo. H. Griggs	M. Heitzman	Williamsburg, L. I.
St. Paul & Pacific	J. C. Monroe	T. W. Heathcote	St. Paul, Minn.
St. Paul & Sioux City	F. C. Butterfield	J. W. Lydic	Shakopee, Minn.
St. Louis, Vandalia, T. Haute & Ind.	C. R. Peddle	H. Kirmse	Terre Haute, Ind.
Indianapolis Division	Wm. Riley		Terre Haute, Ind.
Vandalia Division	A. J. Sanborn.		Effingham, Ind.
South-Carolina	W. B. Smith	John Reed	Charleston, S. C.
Southern Central	Chas. G. Brown	H. Mooney	Auburn, N. Y.
Southern Minnesota	James Waters		Wells, Minn.
South-Western of Georgia	C. D. Wall		Columbus, Ga.
South-Western of Georgia	D. M.Gogul	James A. Knight	Macon, Ga.
South Shore	Warren E. Ray		Cohasset, Mass.
Stanstead, Shefford & Chambly	W. H. Smith		Waterloo, C. E.
Seaboard & Roanoke	§E. G. Ghio	J. B. Pendleton	Portsmouth, Va.
Stonington & Providence	J. H. Anderson	J. H. Anderson	Providence, R. I.
Selma & Gulf	Wm. T. Daughtrey		Selma, Ala.
Selma, Rome & Dalton	A. G. Maynes	W W. Peirce	Selma, Ala.
Sioux City & Pacific	C. H. Foster		Missouri Val., Iowa.
Spartanburg & Union	J. N. Benner	Jacob Rice	Union C. H., S. C.
Sheboygan & Fond du Lac	A. F. Wallace.	A. F. Wallace.	Sheboygan, Wis.
Sullivan & Erie			Tonawanda, Pa.
Syracuse, Binghamton & New-York	H. H. Dawson	David Burling	Syracuse, N. Y.
Syracuse Northern	W. Garrison	L. W. Smith	Syracuse, N. Y.
Sycamore & Cortland			Sycamore, Ill.
St. Louis, Alton & Terre Haute	**Beriah Warren		St. Louis, Mo.
St. Louis & South-Eastern	‖L. B. Salisbury		Mt. Vernon, Ill.
Nashville Division	H. M. Smith.	J. J. Casey	Earlington, Ky.
St. Louis, Kansas City & Northern	H. S Smith	C. S. Buck	Moberly, Mo.
T			
Taunton Branch	W. M. Parks	J. G. Codding	Taunton, Mass.
Tioga	Peres Bonny	D. H. Stratton	Blossburg, Pa
Texas & New-Orleans	R. B. Baer		Houston, Texas.
Tennessee & Pacific	William McKeand.	William McKeand.	Nashville, Tenn.
Toledo, Wabash & Western	R. B. Small	**G. W. Cushing	Fort Wayne, Ind.
Toledo, Wabash & Western		David Hoit	Toledo, Ohio.
Toledo, Wabash & Western	T. G. Gorman		Springfield, Ill.
Toledo, Peoria & Warsaw	W. O. Hewitt	R. M. Hemphill	Peoria, Ill.
Troy & Boston	Foster Church	R. V. Coon	Troy, N. Y.
Toronto, Grey & Bruce	Wm. Bowstead		Toronto, Can.
Toronto & Nipissing	J. Haggus		Toronto, Canada.
U			
Union Pacific	§I. H. Congdon	Geo. E. Stevens	Omaha, Nebraska
Utah Central	Thos. Pierpont	Edward Cox	Salt Lake City.
Utica & Black River	Wm. E. Granger	David James	Utica, N. Y.
Utica, Chenango & Susquehanna	C. H. Brown		Utica, N. Y.
V			
Vicksburg & Brunswick	James Boon	J. A. Knight	Eufaula, Ala.
Vicksburg & Meridian	Jas. B. Browne		Vicksburg, Miss.
Vineland			Vineland, N. J.
Vermont Central	J. M. Foss	J. M. Foss	St. Albans, Vt.
Rutland Division	N. L. Davis		Rutland, Vt.
New-London Northern Division	J. W. Dow	S. W. Caulkins	New-London, Ct.
Ogdensburg & L. Champlain Div.	William A. Short.	J. R. Ames	Malone, N. Y.
Vermont & Massachusetts	D. T. Davis	Jacob Marsh	Fitchburg, Mass.
W			
Wash. City, Va. Midland & Gr. Southern			Alexandria, Va.
Western Union	John Taylor	E. A. Eddy	Racine, Wis.
Wicomico & Pocomoke			Berlin, Md.
Wilmington, Columbia & Augusta	George Hall	W. J. Calais	Wilmington, N .C.
Westchester & Philadelphia	John Moyer	N. Pawling	Philadelphia. Pa.
Wilmington & Weldon	John Bissit.	John Bissit	Wilmington, N. C.
Wilmington & Western			Wilmington, Del.
Wilmington & Reading	Jas. F. Van Horn		Coatesville, Pa.
West-Jersey	W. McAllister	C. C. Williams	Camden, N. J.
Western Maryland	Wm. Cannan	J. H. Nussear	Union Bridge, Md.
Winona & St. Peter	F. C. Ford	H. L. Preston	Winona, Minn.
Western North-Carolina	J. D. Hollister		Salisbury, N. C.
Western R. R. N. C	M. W. Atkinson	M. W. Atkinson	Fayetteville, N. C.
West-Feliciana	R. C. Brower	Wm. Grawling	Woodville, Miss.
Western & Atlantic	John H. Flynn	Wm. Grambling	Atlanta, Ga.
West-Wisconsin	L. T. Mead	J. C. Fischer	Hudson, Wis.
Worcester & Nashua	Albert Griggs.	Albert Griggs	Worcester, Mass.
Welland	James Taylor	James Chase	St. Catharine, C. W.
Washington & Ohio	Edward Dunn.	Joshua Harrison	Alexandria, Va.
White Water Valley	A. W. Britton		Harrison, Ohio.

DIRECTORY

OF

Railway Superintendents and Purchasing Agents

THROUGHOUT THE UNITED STATES AND CANADA.

REFERENCES.—* General Manager. † Managing Director.

A

Railroad.	*Superintendent.*	*Purchasing Agent.*	*Residence.*
Arkansas Central	James E. Gregg		Helena, Ark.
Alabama Central	John M. Bridges		Montgomery, Ala.
Albany & Susquehanna	*C. F. Young		Albany, N. Y.
Alexandria & Fredericksburg	E. L. Dubarry		Washington, D. C.
Atchison, Topeka & Santa Fe	G. H. Nettleton	G. H. Nettleton	Topeka, Kansas.
Atchison & Nebraska	C. C. Smith	C. C. Smith	Atchison, Kansas.
Alabama & Chattanooga	R. C. McCalla	J. C. Stanton, Jr.	Chattanooga, Tenn.
Ashtabula, Youngstown & Pittsburg	D. B. McCoy		Pittsburg, Pa.
Atlanta & Richmond Air Line	R. Y. Sage		Atlanta, Ga.
Atlanta & West-Point	L. P. Grant		Atlanta, Ga.
Atlantic & Gulf	H. S. Haines		Savannah, Ga.
Atlantic & North-Carolina	E. G. Stanley		New-Berne, N. C.
Atlantic & Great Western	P. D. Cooper	R. B. Browne	Meadville, Pa.
First and Second Division	A. L. Dunbar	" "	
Third and Fourth Division	T. A. Phillips		Galion, Ohio.
Mahoning Division	J. M. Ferris		Cleveland, Ohio.
Atlantic & Pacific	A. A. Talmage	W. H. Patriarche	St. Louis, Mo.
Atlantic, Mississippi & Ohio	Henry Fink		Lynchburg, Va.
Atlantic, Tennessee & Ohio	J. J. Gormly		Charlotte, N. C.
Allegheny Valley	J. J. Lawrence	J. J. Lawrence	Pittsburg, Pa.
Adirondack	C. H. Ballard		Saratoga, N. Y.

B

Baltimore & Ohio	Thos. L Sharp	Benj. Williams	Baltimore, Md.
Central Ohio & Lake Erie Div.	W. C. Quincy		Columbus, Ohio.
Baltimore & Potomac	J N. Dubarry		Baltimore, Md.
Bangor & Piscataquis	M. H. Angel	L. H Eaton	Bangor, Maine.
Boston & Albany	C. O. Russell		Springfield, Mass.
Boston & Providence	A. A. Folsom	A. A. Folsom	Boston, Mass.
Boston, Clinton & Fitchburg	*H. A. Blood		Fitchburg, Mass.
Boston, Clinton & Fitchburg	S. A. Webber		Fitchburg, Mass.
Boston, Concord & Montreal	J. A Dodge	Lyon & Vose	Boston, Mass.
Boston & Maine	J. T. Furber	M. E Wood	Boston, Mass.
Boston, Lowell & Nashua	J. B. Winslow		Boston, Mass.
Blossburg, Corning & Tioga	A. H. Gorton	R. J. Burnham	Watkins, N. Y.
Brockville & Ottawa	H. Abbott		Brockville, Canada.
Burlington & Missouri River (in Neb.)	C. F. Morse	C. F. Morse	Plattsmouth, Neb.
Burlington, Cedar Rapids & Minnesota	William Greene	S. L. Dows	Cedar Rapids, Ia.
Burlington & South-Western	R. T. Hosford		Burlington, Iowa.
Buffalo & Jamestown	P. C. Doyle		Buffalo, N. Y.
Buffalo, New-York & Philadelphia	J. D. Yeomans		Buffalo, N. Y.
Buffalo, Corry & Pittsburg	H. H Potter	N. M. Whitside	Corry, Pa.

C

Cairo & Fulton	J. H. Morley	W. H. Hallett	Little Rock, Ark.
Cairo & Vincennes	L. W Palmer		Cairo, Ill.
Camden & Atlantic	E. Collings		Camden, N. J.
Canada Southern	*J. S. Casement		St. Thomas, Ont.
Carolina Central	S. L. Fremont		Wilmington, N. C.
Catasauqua & Fogelsville	C. W. Chapman	C. W. Chapman	Catasauqua, Pa.
Central Pacific	A. N. Towne	J. R. Watson	Sacramento, Cal.
Sacramento & Oregon Division	J. A. Fillmore		Sacramento, Cal.
Central of Georgia	Wm. Rogers	H. Yonge	Savannah, Ga.
Central of Iowa	D. N. Pickering		Marshalltown, Ia.
Central Raiload of New-Jersey	R. E. Ricker	W. S. Holden	Elizabeth, N. J.
Chesapeake & Ohio	A. H. Perry	J. A. Netherland	Richmond, Va.
Middle Division	H. D. Chapin		Staunton, Va.
Charlotte, Columbia & Augusta	James Anderson		Columbia, S. C.
Chicago & Lake Huron	E. B. Taylor	J. E. Quick	Port Huron, Mich.
Chicago & North-Western	Marvin Hughitt	R. W. Hamer	Chicago, Ill.
Wisconsin & Mill. Division	Arthur A. Hobert		Chicago, Ill.
Peninsula Division	S. C. Baldwin		Escanaba, Mich.
Madison Division	J. H. Stewart		Madison, Wis.
Kenosha Division	A. A. Hobart		Madison, Wis
Galena Division	Edward J. Cuyler		Chicago, Ill.
Eastern Iowa Division			Clinton, Iowa.
Western Iowa Division	John A. Head		Boone, Iowa.
Chicago & Alton	J. C. McMullen	A. V. Hartwell	Chicago, Ill.
Chicago, Burlington & Quincy	R. Harris	H. J. Higgins	Chicago, Ill.
Eastern and Middle Division	C. H. Chappel		Aurora, Ill.
Galesburg Division	H. Hitchcock		Galesburg, Ill.
Quincy Division	N. D. Munson		Quincy, Ill.
Chicago, Dubuque & Minnesota	C. H. Hudson	F. T. Massey	Dubuque, Iowa.
Chicago & Iowa	C. B. Hinkley		Chicago, Ill.
Chicago & Pacific	R. C. Tate		Chicago, Ill.
Chicago, Rock Island & Pacific	Hugh Riddle	A. Manvel	Chicago, Ill.
Illinois Division	Allen Manvel		Chicago, Ill.
Iowa Division	A. Kimball		Davenport, Iowa.
Chicago & Michigan Lake Shore	A. H. Morrison	Wm. R. Morrison	St. Joseph, Mich.
Chicago, Danville & Vincennes	L. Pearson	C. B. Mansfield	Chicago, Ill.
Chicago, Pekin & Southwestern	N. J. T. Dana		Streator, Ill.
Cincinnati, Wabash & Michigan	A. G. Wells		Wabash, Ind.
Cleveland, Columbus, Cincinnati & Ind.	E. S. Flint		Cleveland, Ohio.
Indianapolis Division	C. C. Gale		Indianapolis, Ind.
Columbus Division	Robert Blee		Cleveland, Ohio.
Cincinnati Division	R. H. Shoemaker		Cincinnati, Ohio.
Cleveland & Pittsburg	*J. N. McCullough		Pittsburg, Pa.
Cleveland, Mt. Vernon & Delaware	G. A. Jones		Akron, Ohio.
Cincinnati & Martinsville	T. C. Burnside		Franklin, Ind.
Cincinnati & Terre Haute	Matt. P. Wood	Matt. P. Wood	Terre Haute, Ind.
Cin., Cumberland Gap & Charleston	W. J Taylor		Knoxville, Tenn.
Cincinnati, Hamilton & Dayton	Lewis Williams	P. Hickey	Cincinnati, Ohio.
Cincinnati & Indianapolis Junction	M. M. Martin		Indianapolis, Ind.
Cincinnati, Lafayette & Chicago	E. H. Waldron	J. W. Haight	Lafayette, Ind.
Cincinnati, Sandusky & Cleveland	G. T. Benedict	J. C. Buxton	Sandusky, Ohio.
Colorado Central	T. E. Sickles		Golden, Col.
Columbus & Hocking Valley	J. W. Doherty	J. W. Doherty	Columbus, Ohio.
Concord & Claremont	George E. Todd		Concord, N. H.
Concord	H. E. Chamberlin	H. E. Chamberlin	Concord, N. H.
Connecticut River	John Mulligan	John Mulligan	Springfield, Mass.
Connecticut & Passumpsic Rivers	Wm. M. Parker		Lyndonville, Vt.
Connecticut Valley	Hiram Fowler		Hartford, Ct.
Connecticut Western	W. H. Yeomans		Hartford, Ct.
Corning & Tioga	L. H. Shattuck		Blossburg, Pa.
Cumberland Valley	I. F. Boyd	I. F. Boyd	Chambersburg, Pa.

D

Danbury & Norwalk	John W. Bacon		Danbury, Ct.
Dakota Southern	J. S. Meckling	J. S. Meckling	Sioux City, Iowa.
Davenport & St. Paul	N. H. Wood		Urbana, Ill.
Dayton & Michigan	J. H. Weller		Dayton, Ohio.
Dayton & Union	C. C. Gale		Indianapolis, Ind.
Delaware	H. F. Kenney		Philadelphia, Pa.
Delaware & Hudson	R. Manville		Carbondale, Pa.
Delaware, Lackawanna & Western	W. F. Halstead	G. W. B. Cushing	Scranton, Pa.
Morris & Essex Division	Andrew Reasmer	G. W. Bleashing	Hoboken, N. J.
Oswego and Syracuse Division	W. B. Phelps		Oswego, N. Y.
Utica, Chenango & Sus. Division	George F. Thompson		Utica, N. Y.
Denver & Rio Grande	W. W. Borst	W. S. Jackson	Denver, Col.
Des Moines Valley	John Givin	G. E. Kilbourne	Keokuk, Iowa.
Detroit & Bay City	T. B. Sargent		Detroit, Mich.
Detroit and Milwaukee	Andrew Watson	John S. Lorimer	" "
Detroit, Hillsdale & Indiana	W. F. Parker		Ypsilanti, Mich.
Detroit, Eel River & Illinois	A. B. Southard		Denver, Ind.
Detroit, Lansing & Lake Michigan	A. H. Reese		Detroit, Mich.
Dorchester & Delaware	D. Stewart Hessey		Cambridge, Md.
Dunkirk, Allegheny Valley & Pittsburg	D. Thayer	C. V. DeForest	Dunkirk, N. Y.
Dubuque & South-Western	J. P. Farley		Dubuque, Iowa

E

East-Tennessee, Virginia & Georgia	Joseph Jaques		Knoxville, Tenn.
Eastern (Mass.)	J. Prescott	C. W. Pratt	Boston, Mass.
Elizabethtown & Paducah	D. Brock	D. Brock	Elizabethtown, Ky.
Erie	P. P. Wright	W. W. Tallman	New-York, N. Y.
Eastern Division	E. O. Hill		Port Jervis, N. Y.
Delaware Division	Benj. Thomas		Port Jervis, N. Y.
Susquehanna & Rochester Div.	C. W. Gardner		Elmira, N. Y.
Western & Buffalo "	R. G. Taylor		Buffalo. N. Y.
European & North-American	M. H. Angel	M. H. Angell	Bangor, Maine.
Erie & Pittsburg	John M. Kimball	Wm. Mullins	Erie, Pa.
Evansville & Crawfordsville			Evansville, Ind.
Evansville, Terre Haute & Chicago	Jos. Collett, Jr.		Terre Haute, Ind.

F

Fitchburg	Chas. L. Haywood	John Adams	Boston, Mass.
Flint & Pere Marquette	G. C. Kimball	G. C. Kimball	East-Saginaw, Mich.
Flushing & North-Side			Hunter's Point, L. I.
Fort Wayne, Jackson & Saginaw	W. A. Ernst	H. A. Ernst	Jackson, Mich.
Fort Wayne, Muncie & Cin	W. W. Worthington		Fort Wayne, Ind.

G

Galveston, Harrisburg & San Antonio	G. B. Nichols	J. W. Pierce	Galveston, Texas.
Galveston, Houston & Henderson	G. B. Nichols		Galveston, Texas.
Georgia	S. K. Johnson		Augusta, Ga.
Gilman, Clinton & Springfield	S. H. Melvin		Springfield, Ill.
Grand Rapids & Indiana	*C. E. Gorham		Fort Wayne, Ind.
S. Division	J. M. Matheany		Fort Wayne, Ind.
N. Division	H. D. Wallen, Jr		Grand Rapids, Mich
Grand Rapids & Indiana		William Mullins	Pittsburg, Pa.
Grand Trunk	C. J. Brydges	John Taylor	Montreal, Canada.
East Division	Henry Bailey		
West Division	W. J. Spicer		
Grand Tower and Carbondale	H. V. Olyphant	Wm. W. Harris	Grand Tower, Ill.
Great Western (Canada)	William K. Muir	Robert Beatty	Hamilton, Canada.
Green Bay & Lake Pepin	D. N. Kelly		New-York City.
Greenville & Columbia	Thomas Dodamead		Columbia, S. C.

H

Hannibal & St. Joseph	O. S. Lyford		Hannibal, Mo.
Hartford, Providence & Fishkill	Samuel Nott		Hartford, Ct.
Housatonic	H. W. Franklin		Bridgeport, Ct.
Houston & Texas Central	J. Durand	W. M. Rice, N.Y.	Houston, Texas.
Southern Division	W. H. Vaughan		Houston, Texas.
Northern Division	M. G. Carey		Corsicana, Texas.
Huntingdon & Broad Top	J. McKillips	B. A. Knight	Huntingdon, Pa.

I

Illinois Central	A. Mitchell	O. Ott	Chicago, Ill.
Chicago Division	C. A Beck		Centralia, Ill.
Northern Division	J. C. Jacobs		Amboy, Ill.
Iowa Division	D. W. Parker		Dubuque, Iowa.
Illinois & St. Louis	W. K. McComas		St Louis, Mo.
Indianapolis, Bloomington & Western	J. E. Gimperling		Urbana, Ill.
Indianapolis, Cincinnati & Lafayette	George L. Barringer		Cincinnati, Ohio.
Indianapolis & Vincennes	E. W. McKenna		Indianapolis, Ind.
Indianapolis & Vincennes		Wm. Mullins	Pittsburg, Pa.
Indianapolis & St. Louis	S. Woodward	J. W. Morse	St. Louis, Mo.
Indianapolis, Peru & Chicago	C. B. Robinson	D. Macy	Indianapolis, Ind.
Michigan City Division	E. C. Murphy		La Porte, Ind.
Intercolonial Railway	Lewis Carvell		Moncton, N. B.
International & Houston & Gt. Northern	H. M. Hoxie		Houston, Texas.
Iowa Midland	J. B. Watkins		Clinton, Iowa.

J

Jacksonville, North-Western & S. E.	E. S. Greenleaf		Jacksonville, Ill.
Jacksonville, Pensacola & Mobile	S. Conant		Jacksonville, Fla.
Jefferson, Madison & Indianapolis	Horace Scott	Wm. Mullins	Louisville, Ky.
Junction & Breakwater	John A. Sheaff		Lewis, Del.

K

Kansas Central	A. E. Buchanan		Leavenworth, Kan.
Kansas City, St. Joseph & Council Bluffs	J. F. Barnard		Detroit, Mich.
Kansas Pacific	Edward S. Bowen		Kansas City, Mo.
Kansas Pacific		J. L. Woods	St. Louis, Mo.
Kaw Valley Division	George Noble		Lawrence, Kansas.
Smoky Hill Division	O. H. Dorrance		Ellis, Kansas.
Denver Division	C. W. Fisher		Denver, Col.
Kentucky Central	G. H. Pendleton	Geo. P. Bowler	Covington, Ky.
Knox & Lincoln	C. A. Combs	Oliver Morse	Bath, Maine.

L

Lackawanna & Bloomsburg	D. T. Bound	G. W. B. Cushing	Kingston, Pa.
Lake Erie & Louisville	I. H. Burgoon		Fremont, Ohio.
Lake Ontario Shore	E. A. Van Horne		Oswego, N. Y.
Lake Shore & Tuscarawas Valley	W. W. Card		Cleveland, Ohio.
Lake Superior & Mississippi	G. H. Smith		
Lake Shore & Michigan Southern	Charles Paine	A. C. Armstrong	Cleveland, Ohio.
Kalamazoo Division	William Wheaton		Kalamazoo, Mich.
Detroit Division			
Lansing Division			
Leavenworth, Lawrence & Galveston	Chas. B. Peck	E. O. Foote, Jr.	Lawrence, Kan.
Lawrence & South-Western	R. B. Gemmell	R. B. Gemmell	Lawrence, Kan.
Lehigh Valley	Robert H. Sayre		Bethlehem, Pa.
	L. Chamberlin		Philadelphia, Pa.
Beaver Meadow Division	A. G. Brodhead, Jr.		Mauch Chunk, Pa
Mahony Division	James I. Blakslee		Mauch Chunk, Pa.
Wyoming Division	A. Mitchell		Wilkesbarre, Pa.
Little Rock & Fort Smith	S. B. Beaumont		Little Rock, Ark.
Logansport, Crawfordsville & S. W.			Cincinnati, Ohio.
Long Island	Jno. B. Morford	Oliver Charlick	Hunter's Point, L. I.
Louisville & Nashville & G. Southern	Albert Fink	G. C. Breed	Louisville, Ky.
Clarksville Division	Robert Meek		Clarksville, Tenn.
Memphis Division	J. T. Flynn		Memphis, Tenn.
Nashville & Decatur Division	D. F. Whitcomb		Nashville, Tenn.
So. & North Ala. Division	M. Stanton		Birmingham, Ala.
Louisville, Cin. & Lexington	George Skinner	Geo. Skinner	Louisville, Ky.
Louisville, New-Albany & Chicago	M. Sloat	J. R. Parker	New-Albany, Ind.

M

Macon & Brunswick	William McRae	Solomon Hass	Macon, Ga.
Maine Central	L. L Lincoln	G. A. Phillips	Augusta, Me.
Androscoggin Division	A. Brown		Lewiston, Me.
Manchester & Lawrence	H. E. Chamberlin		Concord, N. H.
Marietta & Cincinnati	W. W. Peabody		Cincinnati, Ohio.
Marietta & Pittsburg	A. J. Warner	R. B. Hoover	Marietta, Ohio.
Marquette, Houghton & Ontonagon	*Samuel Schoch	C. E. Van Cleve	Marquette, Mich.
Maryland & Delaware	J. L. Caldwell	J. L. Caldwell	Easton, Md.
Memphis, Carthage & North-Western	George A. Burt		Carthage, Mo.
Memphis & Little Rock	A. S. Livermore		Memphis, Tenn.
Memphis & Charleston	W. J. Ross	J. B. Galloway	Memphis, Tenn.
Michigan Central	H. E. Sargent		Chicago, Ill.

Railroad.	*Superintendent.*	*Purchasing Agent.*	*Residence.*
Michigan Central		John Newell	Detroit, Mich.
Grand River Valley Division	Chas. Desmond		Grand Rapids, Mich.
Jackson, Lansing & Saginaw Div.	Geo. C. Hopper		Saginaw City, Mich.
South-Haven Division	Geo. E. Curtiss		Kalamazoo, Mich.
Joliet Division	Carlton Wheeler		Joliet, Mich.
South-Bend Division			
Michigan Lake Shore	Chas. E. Gorham		Fort Wayne, Ind.
Michigan Lake Shore	P. S. O'Rourke		Monteith, Mich.
Midland Railway of Canada	H. G. Taylor		Port Hope, Ont.
Midland Pacific	J. N. Converse		Lincoln, Neb.
Milwaukee & Northern	J. W. Crippin		Milwaukee, Wis.
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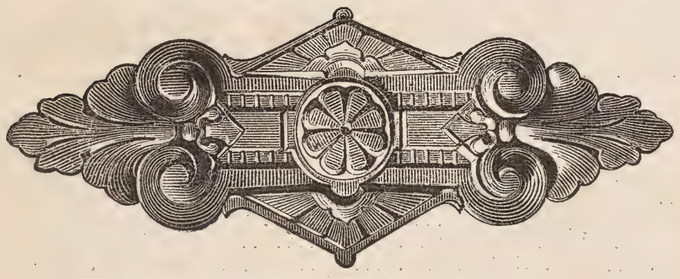

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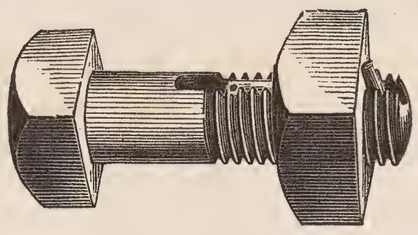
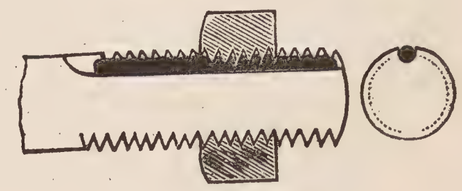


"CUMMING NUT-LOCK,"

Patented

June 16, 1868,

August 23, 1870.



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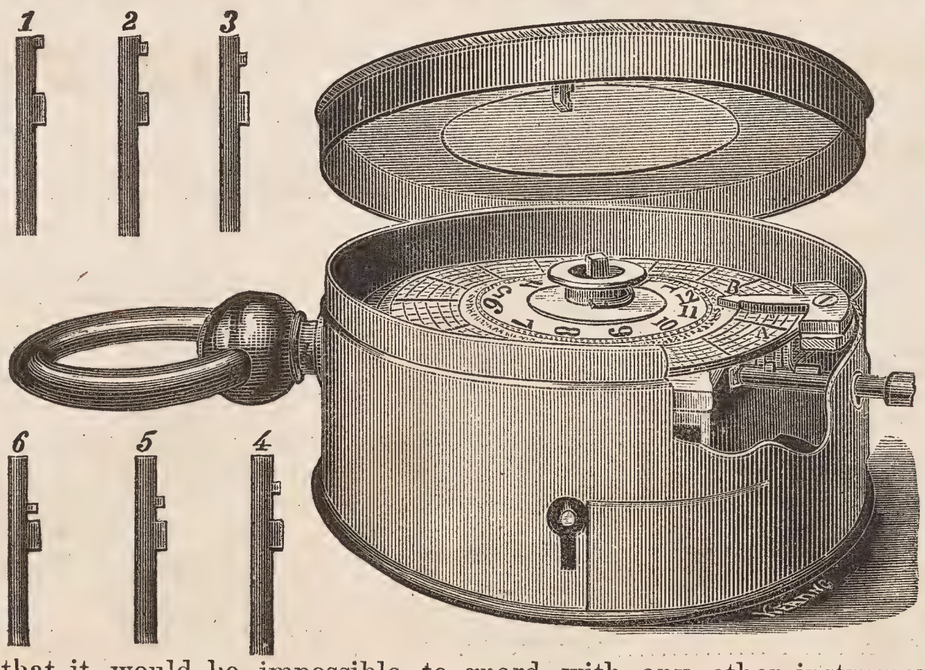

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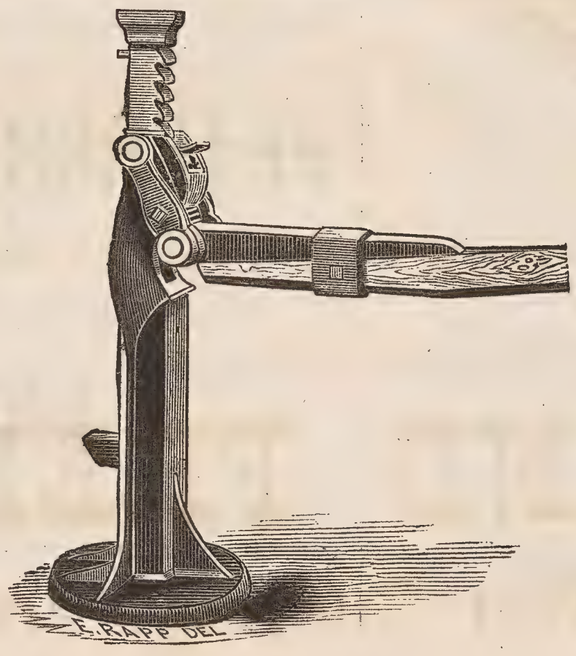

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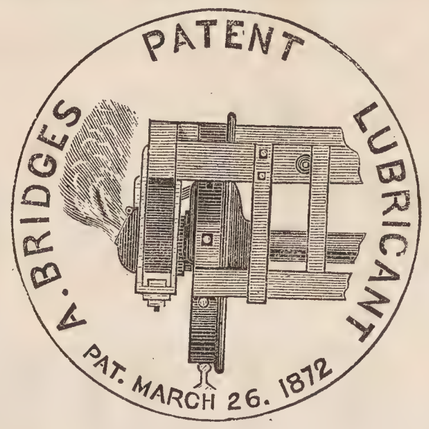

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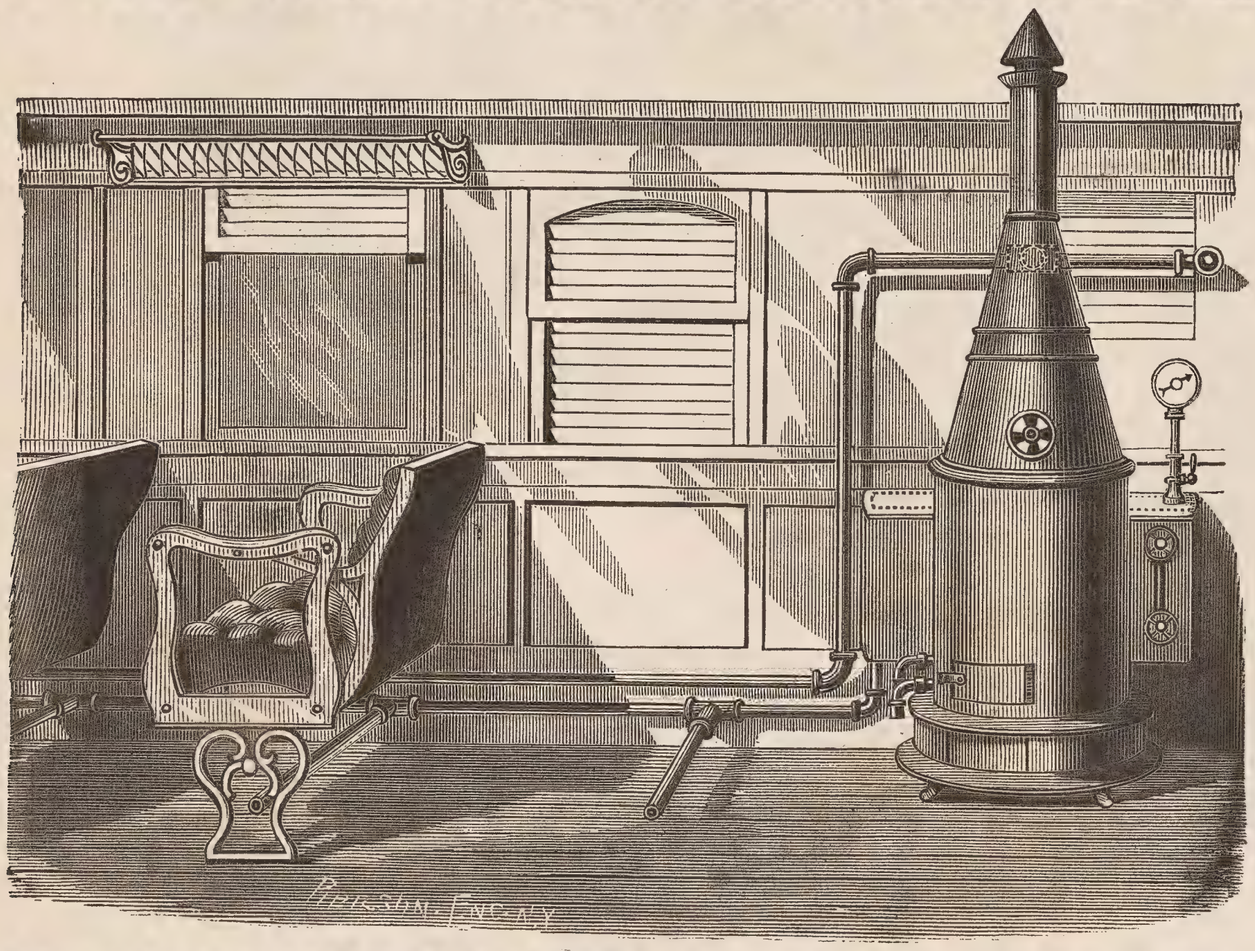

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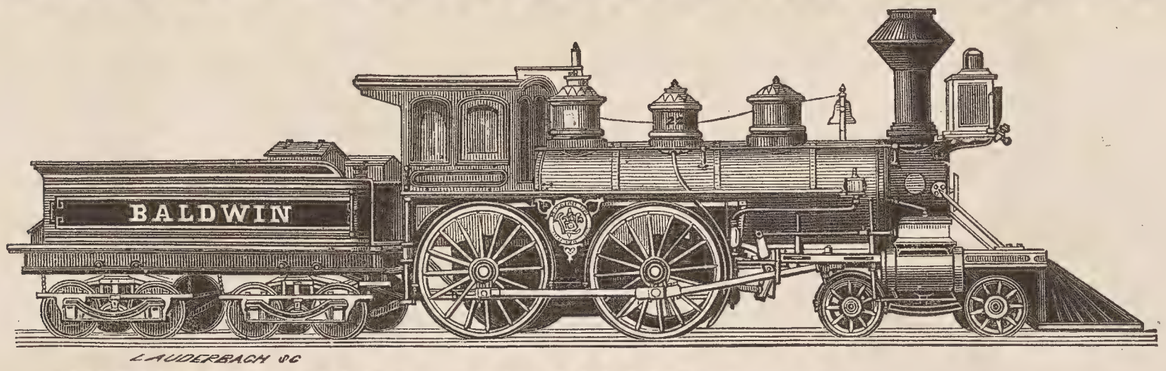

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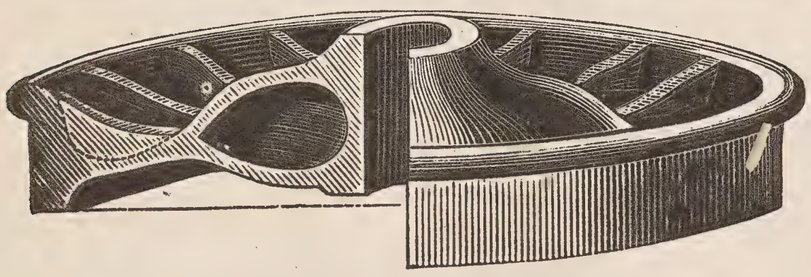

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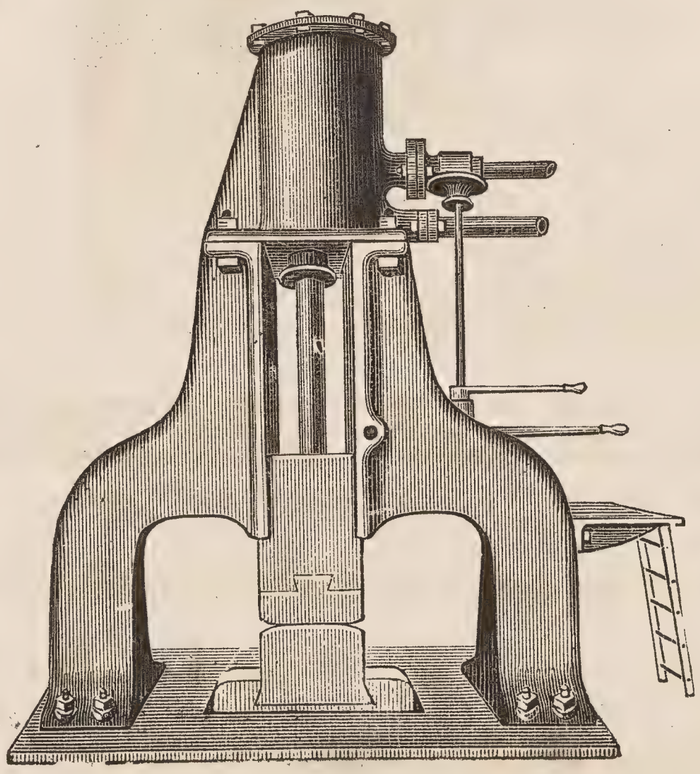

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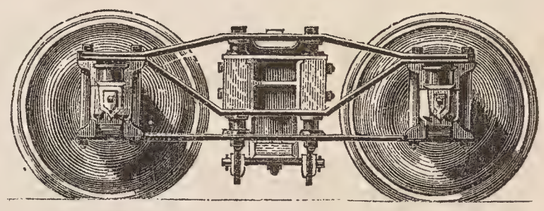

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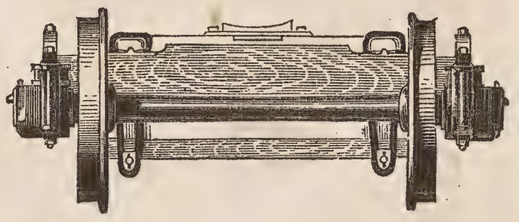

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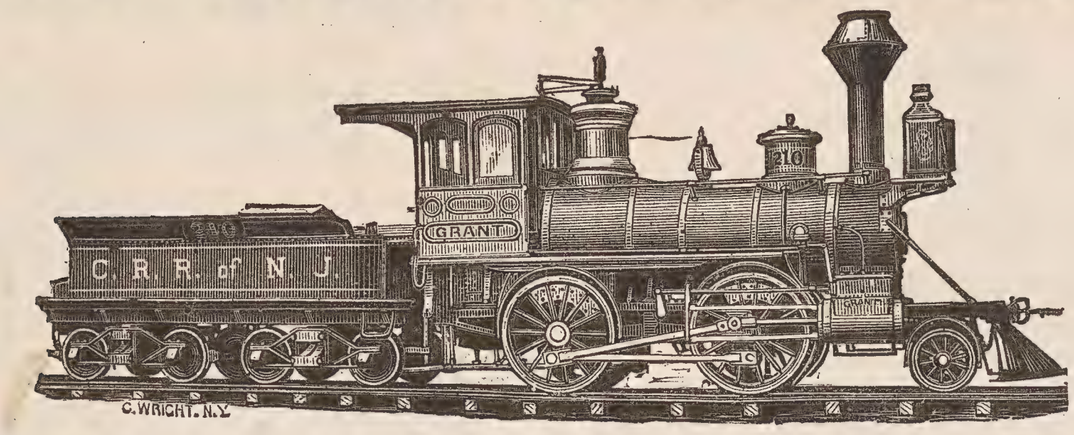

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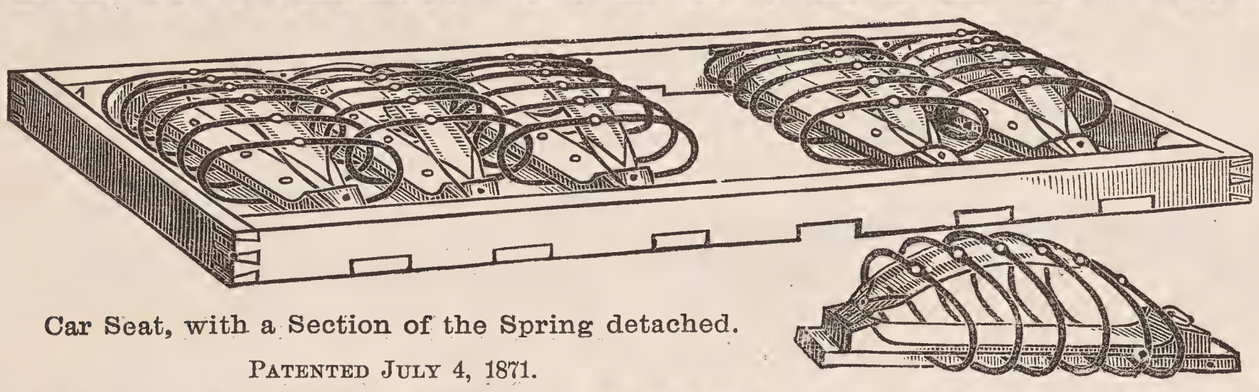

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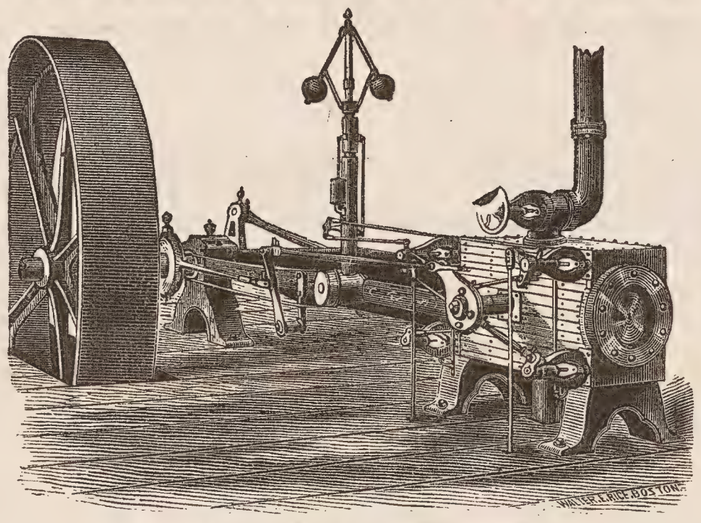

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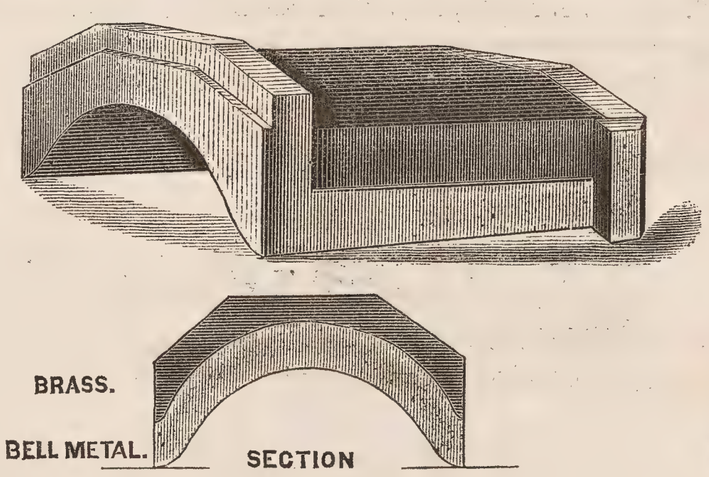

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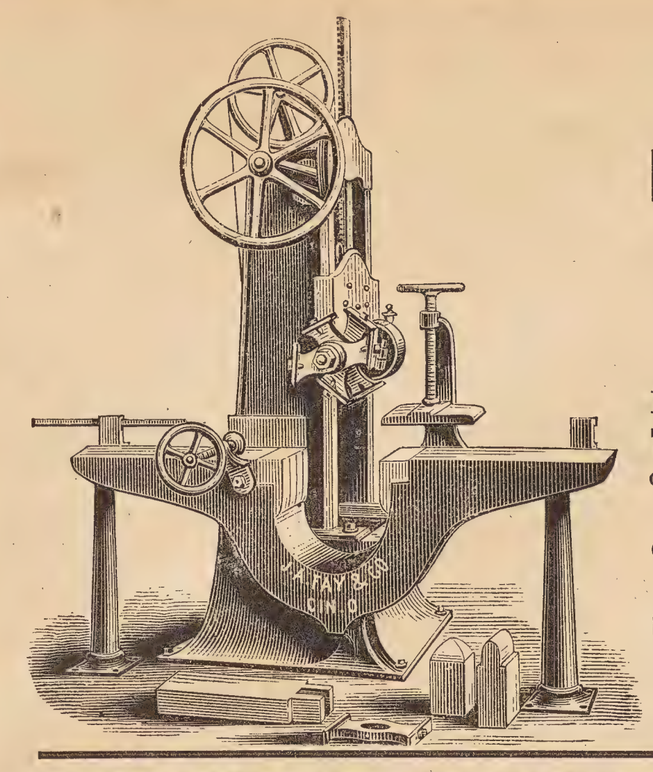

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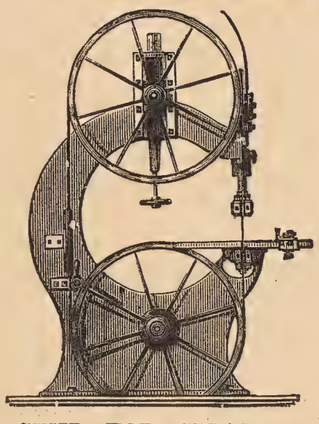

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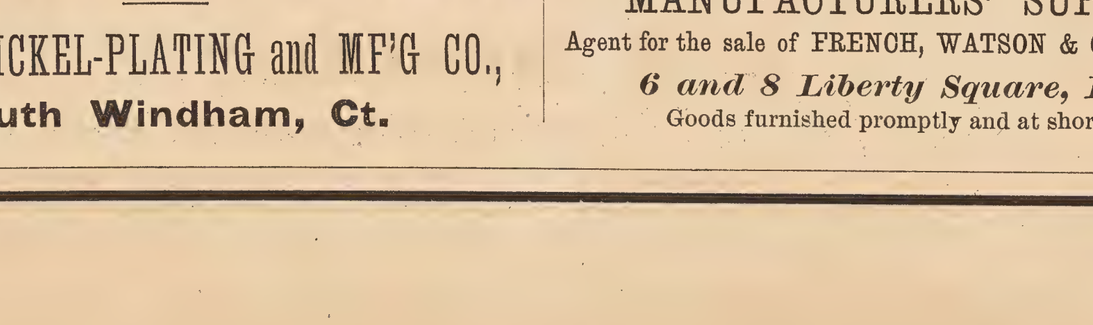

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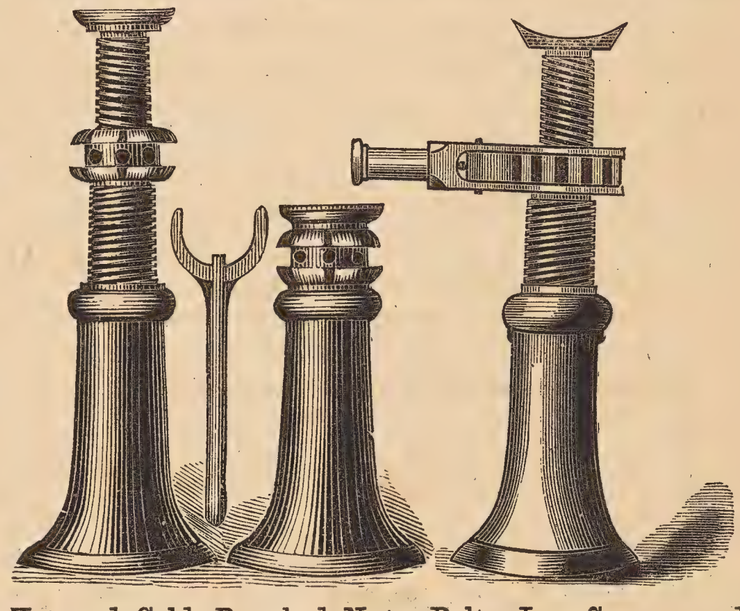

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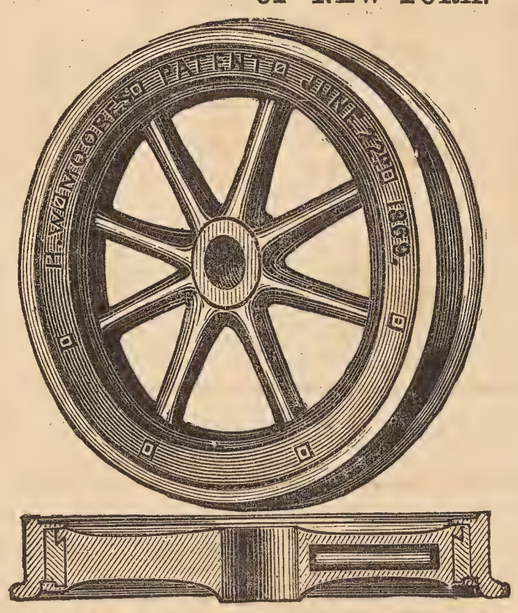

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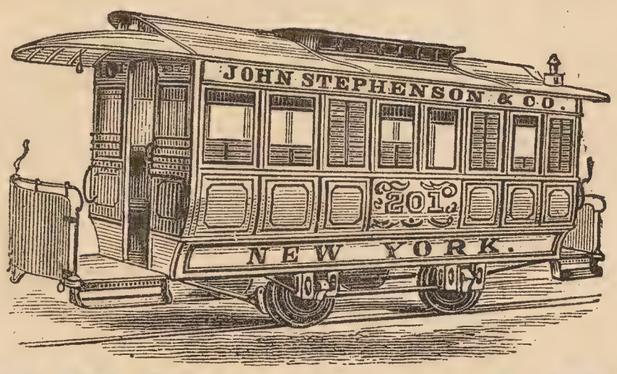

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